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ENHANCEMENT LAKE REBECCA HASTINGS MINNESOTA(U) CORPS OF
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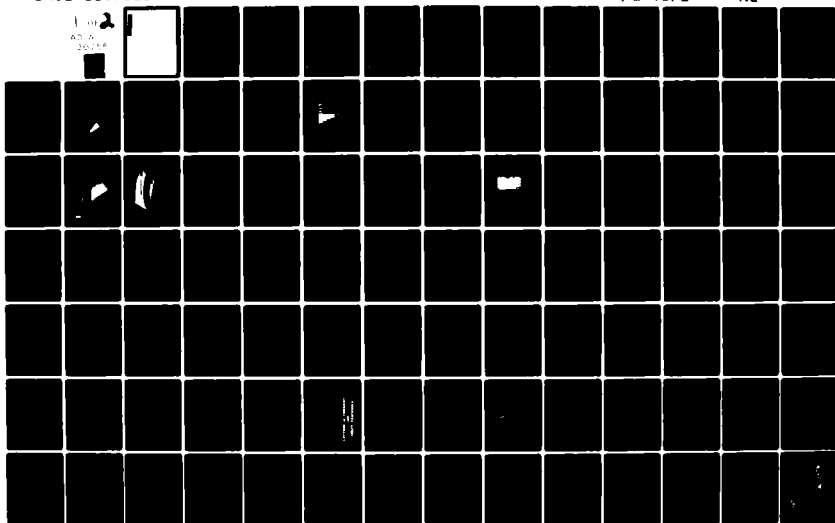
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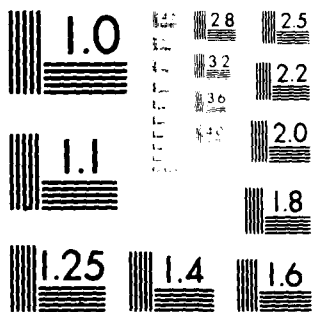
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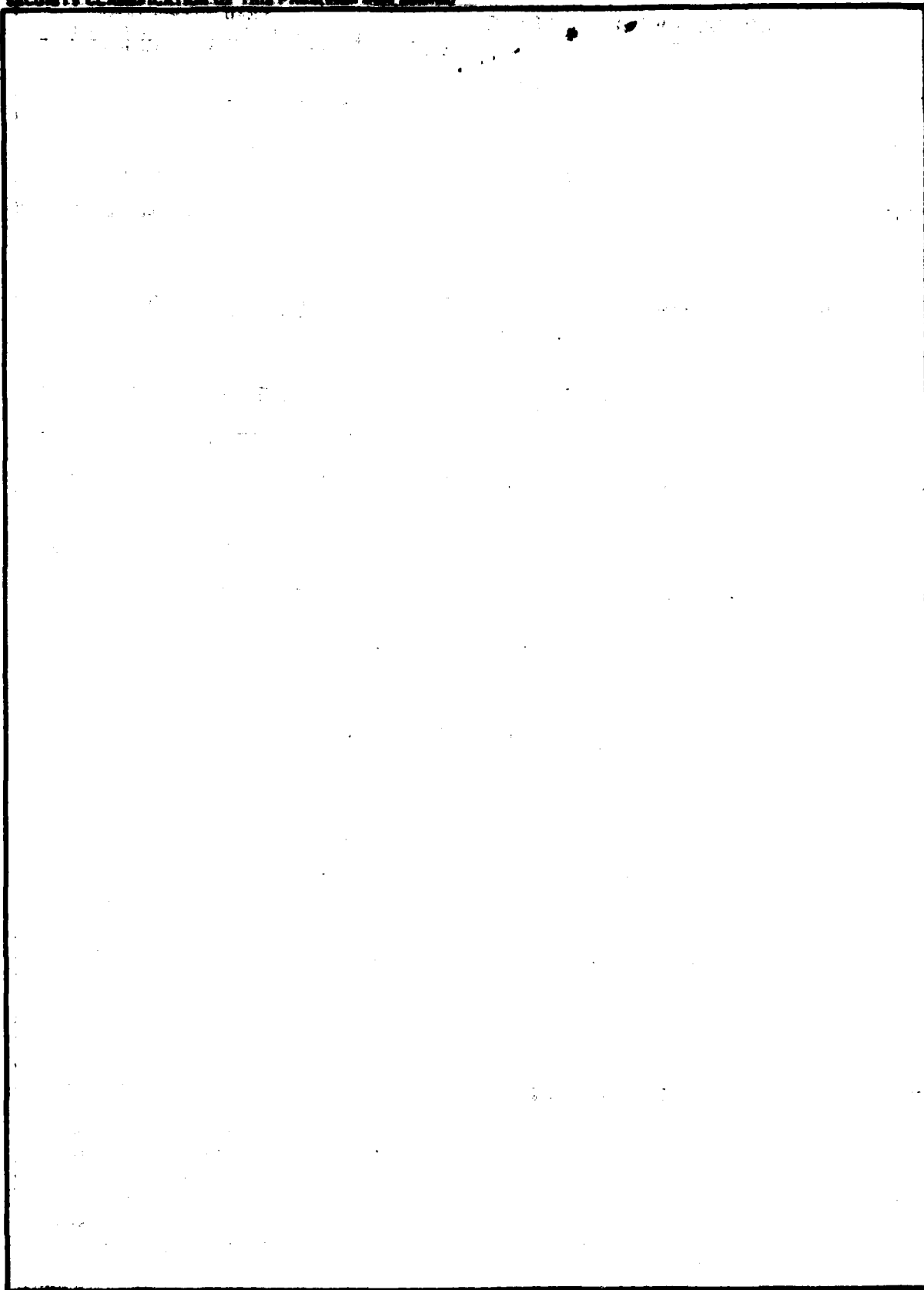
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**FINAL
ENVIRONMENTAL IMPACT STATEMENT
RECREATIONAL DEVELOPMENT AND FISH AND WILDLIFE
ENHANCEMENT
LAKE REBECCA, HASTINGS, MINNESOTA**

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**U.S. ARMY CORPS OF ENGINEERS
ST. PAUL DISTRICT
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MARCH 1978

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FOREWORD

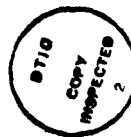
In response to a resolution adopted 15 March 1976 by the City Council of Hastings, Minnesota, the Corps of Engineers conducted a study to determine the feasibility and desirability of a project designed to enhance the fish and wildlife values at Lake Rebecca, Minnesota, and develop public recreation facilities. The enhancement of fish and wildlife values and development of public recreation facilities at Lake Rebecca are authorized by Section 4 of the Flood Control Act of 1944 as amended, and by Section 2 of the Fish and Wildlife Coordination Act of 1958 (Public Law 85-624).

A draft environmental impact statement (EIS) was prepared in June 1977, identifying the environmental, social, and economic impacts of the proposed actions at Lake Rebecca, in accordance with the requirements of the National Environmental Policy Act of 1969 (Public Law 91-190). The draft EIS was presented to the public to gain their comments, and was furnished simultaneously to the President's Council on Environmental Quality.

All comments received on the draft EIS were taken into consideration in preparation of this final EIS, and the comments themselves along with Corps responses are printed on pages 63-76. Following review by higher Corps authority, the final EIS will be furnished to the U.S. Environmental Protection Agency, noted in the Federal Register, and made available to the public. A final 30-day review period will then ensue.

No official action on the proposed project will be undertaken until these steps have been completed. The process is expected to take approximately 3 months; the earliest date this project could be undertaken is expected to be during the construction season of 1978.

In planning a project, coordination with all interested people is a continuing process. For detailed information on the Corps' efforts to maintain such coordination, see Section 9 of this report. Single copies of this report are available at the Corps of Engineers, St. Paul District Office, 1135 U.S. Post Office and Custom House, St. Paul, Minnesota 55101.



SUMMARY

**Recreational Development and Fish
and Wildlife Enhancement
Lake Rebecca, Hastings, Minnesota**

() Draft Environmental Statement (x) Final Environmental Statement

Responsible Office: U.S. Army Engineer District
St. Paul, Minnesota

1. Name of Action: (x) Administrative () Legislative

2. Description of Action: The proposed project is a series of measures designed to enhance the fish and wildlife values of Lake Rebecca and to develop recreational facilities at the lake. Project features include (1) constructing a lake outlet control structure, (2) raising the lake level approximately 2.5 feet and flooding an additional 31 acres of land, (3) constructing a dike to separate a storm sewer discharge from the lake, (4) relocating a 4,000-foot stretch of powerline, (5) installing aeration equipment, and (6) developing recreation facilities at the lake, such as a swimming beach, boat/canoe launch, picnic area, access roads, parking lots, and nature interpretation trails. As part of the project the Minnesota Department of Natural Resources would eradicate the existing fishery and restock the lake. Once constructed, the project's operation and maintenance would become the responsibility of the city of Hastings.

3. a. Environmental Impacts: The proposed project would create a viable sport fishery in Lake Rebecca. The water quality of the lake would be protected from Mississippi River inflows and storm sewer discharge. Recreational facilities would be provided for an estimated usage of 90,200 recreation days annually. The wetland acreage in the project area would be moderately increased (about 22 acres). The lake would become more attractive for waterfowl, both as a nesting area and a migration stop-over point.

b. Adverse Environmental Effects: There would be some minor noise, air quality, and visual degradation during construction from equipment operation, dust, and vegetation clearing. There would be a loss of about 27 acres of floodplain forest from flooding and clearing for recreational facility development. The existing fishery of the lake would be eradicated. The operation of aeration equipment would create open water holes in the ice, a potential safety hazard. Increased use of the area would increase traffic on access streets and highways. The return of vascular aquatic

plant growth to the lake may reach nuisance levels requiring cosmetic maintenance of high-use areas such as the boat launch and beach areas.

4. Alternatives:

- a. No Action
- b. Winterkill Alleviation Alternatives
- c. Rough Fish Control Alternatives
- d. Alternative Recreational Facilities
- e. Alternative Storm Sewer Diversion
- f. Alternative Power Line Relocation Routes
- g. Lesser Lake Raise
- h. Alternative Plan for Vegetation Clearing
- i. Dredging

5. Coordination: For a list of those who have been sent copies of the draft statement, see page 61.

6. a. Draft Statement to CEQ 2 August 1977 .
b. Final Statement to EPA .

FINAL
ENVIRONMENTAL IMPACT STATEMENT
RECREATIONAL DEVELOPMENT AND FISH
AND WILDLIFE ENHANCEMENT
LAKE REBECCA, HASTINGS, MINNESOTA

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FINAL
ENVIRONMENTAL IMPACT STATEMENT
RECREATIONAL DEVELOPMENT AND FISH AND WILDLIFE
ENHANCEMENT
LAKE REBECCA, HASTINGS, MINNESOTA

INTRODUCTION

The purpose of this statement is to assess the environmental impacts associated with a proposed recreational development and fish and wildlife enhancement project at Lake Rebecca in Hastings, Minnesota.

1.000 PROJECT DESCRIPTION

LOCATION

1.001 Lake Rebecca is a river bottom lake located on the north side and within the city limits of Hastings, Minnesota (figure 1). Hastings is situated on the west bank of the Mississippi River about 15 miles southeast of St. Paul and approximately 2.5 miles upstream from the confluence of the St. Croix and Mississippi Rivers.

BACKGROUND

1.002 Prior to 1928 Lake Rebecca was a semi-isolated back channel of the Mississippi River about 1.8 miles long and 350 feet wide lying parallel to and approximately 2,600 feet west of the main channel of the Mississippi River. The lake at that time had an inlet and outlet stream. At one time in geologic history this back channel may have been part of the main channel of the Mississippi River.

1.003 In 1928, the Corps constructed Lock and Dam No. 2 (L/D 2) at Hastings as part of the 9-foot channel navigation project. A dike was constructed across the back channel and the upper portion was inundated by Pool 2 of the Mississippi River. The lower portion became the present-day Lake Rebecca.

1.004 Beginning in the 1940's the conditions in Lake Rebecca began to deteriorate and local citizens periodically petitioned the Corps during the 1950's and 1960's to "restore" Lake Rebecca. as they believed Corps construction activities at L/D 2 in the mid-1940's were responsible for the deterioration of the lake. The Corps excavated 1.8 million cubic yards from the river in constructing the second lock at L/D 2 and deposited the material on the island adjacent to Lake Rebecca.

1.005 In 1975 the Corps conducted an investigation to determine if the Corps activities in the 1940's were responsible for the present condition of Lake Rebecca. The finding of that investigation was that, due to the time elapsed since the 1940's, lack of records, and

SECTION ONE

PROJECT DESCRIPTION

conflicting eye witness accounts, it was impossible to determine with certainty the cause for the current state of Lake Rebecca.

PROJECT AUTHORIZATION

1.006 The project would be authorized by Section 4 of the Flood Control Act of 1944 as amended, and by Section 2 of the Fish and Wildlife Coordination Act of 1958 (Public Law 85-624).

PROJECT PURPOSE

Goals

1.007 The proposed project has three goals:

- a. Reestablish a productive sport fishery in Lake Rebecca.
- b. Provide day-use recreational facilities at Lake Rebecca.
- c. Preserve and enhance the valuable wildlife habitat, primarily wetlands, adjacent to Lake Rebecca.

1.008 An underlying goal of the local interests is to develop an available resource and to curb present uncontrolled use of the area that spills over onto adjacent private properties.

Tasks

1.009 During the early planning phases it was recognized that the following features were vital to the accomplishment of the project goals:

- a. Alleviation of the chronic winterkill problem in the lake.
- b. Control of rough fish.
- c. Provision of recreation facilities.

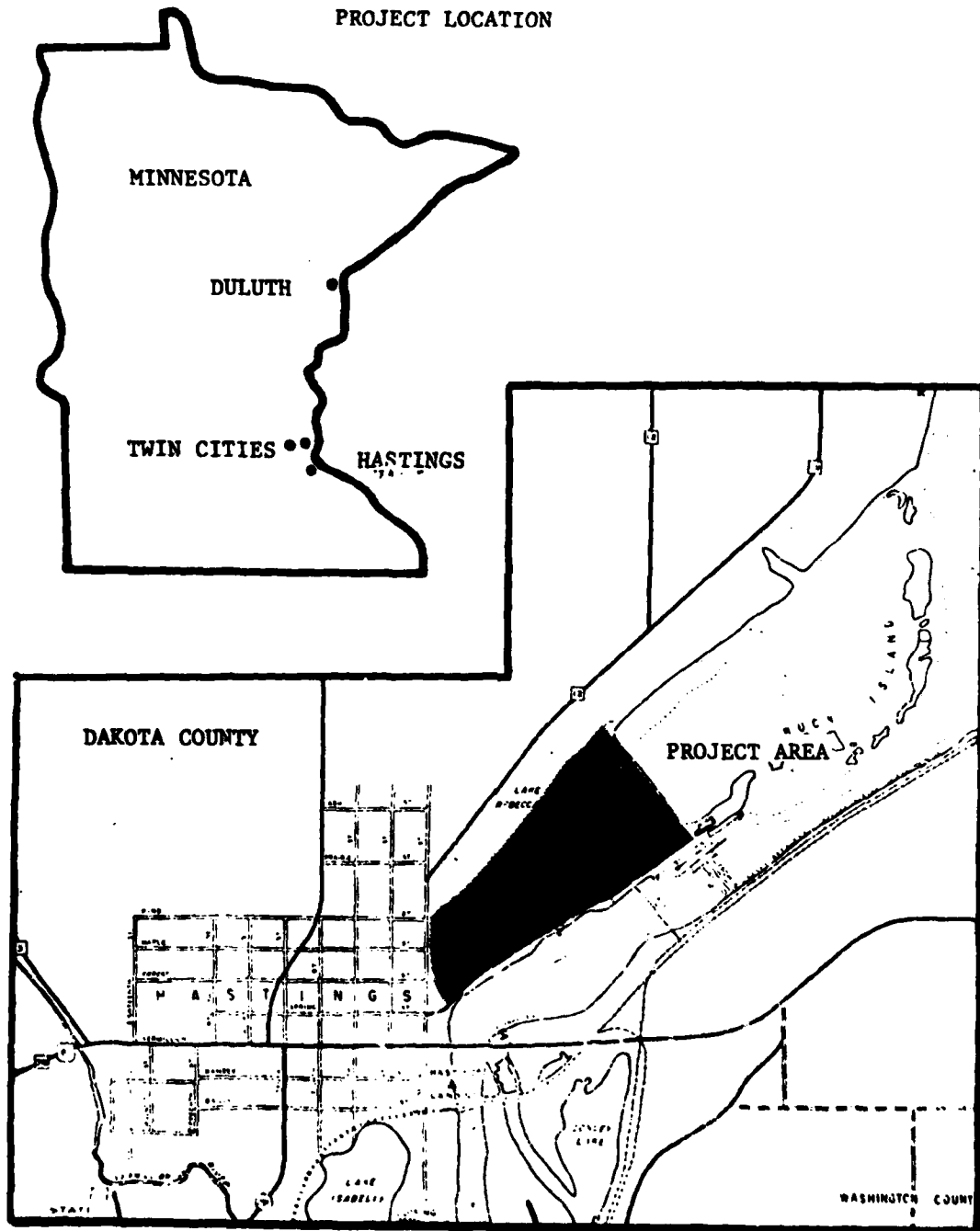
Later on in the planning phases, two other features were added as necessary to achieve project goals:

- a. Storm sewer diversion.
- b. Power line relocation.

1.010 In developing methods to accomplish the five tasks above, a number of features were added either as a direct result of the methods used to accomplish these tasks or as independent features added to enhance the project.

FIGURE 1:

PROJECT LOCATION



PROJECT FEATURES

Earthen Dike

1.011 It is proposed to prevent the storm sewer currently emptying into the outlet stream at the lower end of the lake from entering Lake Rebecca. (This storm sewer drains a 314-acre section of Hastings.) The purpose is to protect the water quality of the lake once the project is undertaken.

1.012 Storm sewer effluent is usually characterized by high levels of suspended solids, nutrients, and fecal coliform counts. Also found at various levels of concentration (dependent upon the type of development found in the drainage area) are herbicides, pesticides, tire residue, exhaust residue (lead), chlorides (street salt), general debris, heavy metals, and animal wastes.

1.013 Up until now, the storm sewer has probably had only minor impact on Lake Rebecca because during most rainfall events the storm sewer flow went directly to the Mississippi River without backing up into the lake. By raising the lake to 680.0, the outlet area becomes part of the lake. Thus, each time it rains the storm sewer effluent would flow into Lake Rebecca, which could lead to a substantial buildup of pollutants and nutrients in the lake.

1.014 Another problem would be health hazards associated with the high fecal coliform counts found in storm sewer effluents. With the beach area located a short distance away, fecal coliform counts at the beach area could exceed health standards every time it rains.

1.015 In the draft EIS it was proposed to divert the storm sewer from the lake via an 84-inch reinforced concrete pipe (RCP) that would bypass the lake and empty directly into the Mississippi. An alternative discussed in the draft EIS was to construct a dike to separate the storm sewer from the lake. Subsurface investigations since the circulation of the draft EIS have revealed that the cost of the diversion RCP would raise project costs beyond the capability of the local sponsor. Therefore, the alternative of a dike is now the proposed method for keeping the storm sewer effluent from entering the lake.

1.016 A 900-foot dike would be constructed from the lock and dam access road to the bluffs upstream of the storm sewer outfall (plates 2 and 3). The top elevation of the dike would be 692.0, about 16 feet over the present surface elevation. The upstream slope would be 1:5, while the downstream slope would be 1:3. The slopes would be grassed, except for an area of riprap where the storm sewer effluent would strike the southwest end of the dike.

1.017 Access to the dike would be controlled by fencing. Only operation and maintenance personnel would be allowed on the dike.

Control Structure

1.018 Lake Rebecca has no inlet and currently outlets via a culvert into the Mississippi River. A lake level control structure would be constructed in the northeast end of the dike (plates 2 and 3). The structure (figure 2) is designed to:

- a. Prevent rough fish entry into the lake from the Mississippi River.
- b. Maintain the elevation of the lake at 680.0.
- c. Prevent Mississippi River floodwaters from backing up into the lake.

1.019 The control structure would have a stop-log spillway with a range in control from 675.0 (normal Mississippi River elevation) to 690.0. The lake would be maintained at 680.0. The stop logs could be removed down to 675.0 if at some time in the future it is desired to return the lake to its present elevation.

1.020 The structure is designed to be vandal proof and to prevent access to the stop logs by anyone other than maintenance personnel.

1.021 The structure is designed to control rough fish with a five-foot vertical drop. Normal Mississippi River elevation is 675.0 and the lake would normally be maintained at 680.0 (see lake raise). When the Mississippi River levels rise with flooding, additional stop logs would be added to maintain the five-foot drop. When the stop logs reach 690.0 and the river rises above 685.0, the five-foot drop would begin to diminish. However, at this time the stop logs would be flush with the top grating and this grating would act as a barrier to jumping fish.

1.022 Adult rough fish should be controlled at all times by the structure. However, as the river rises to 690.0 and higher, smaller rough fish could pass through the grating. If the Mississippi rises above 691.0, it will top the road to L/D 2 and all rough fish control would be lost.

1.023 Figure 3 is a bar graph showing the maximum tailwater elevation frequency for the period 1939-1973. It is estimated that the 17-year flood would top the road.

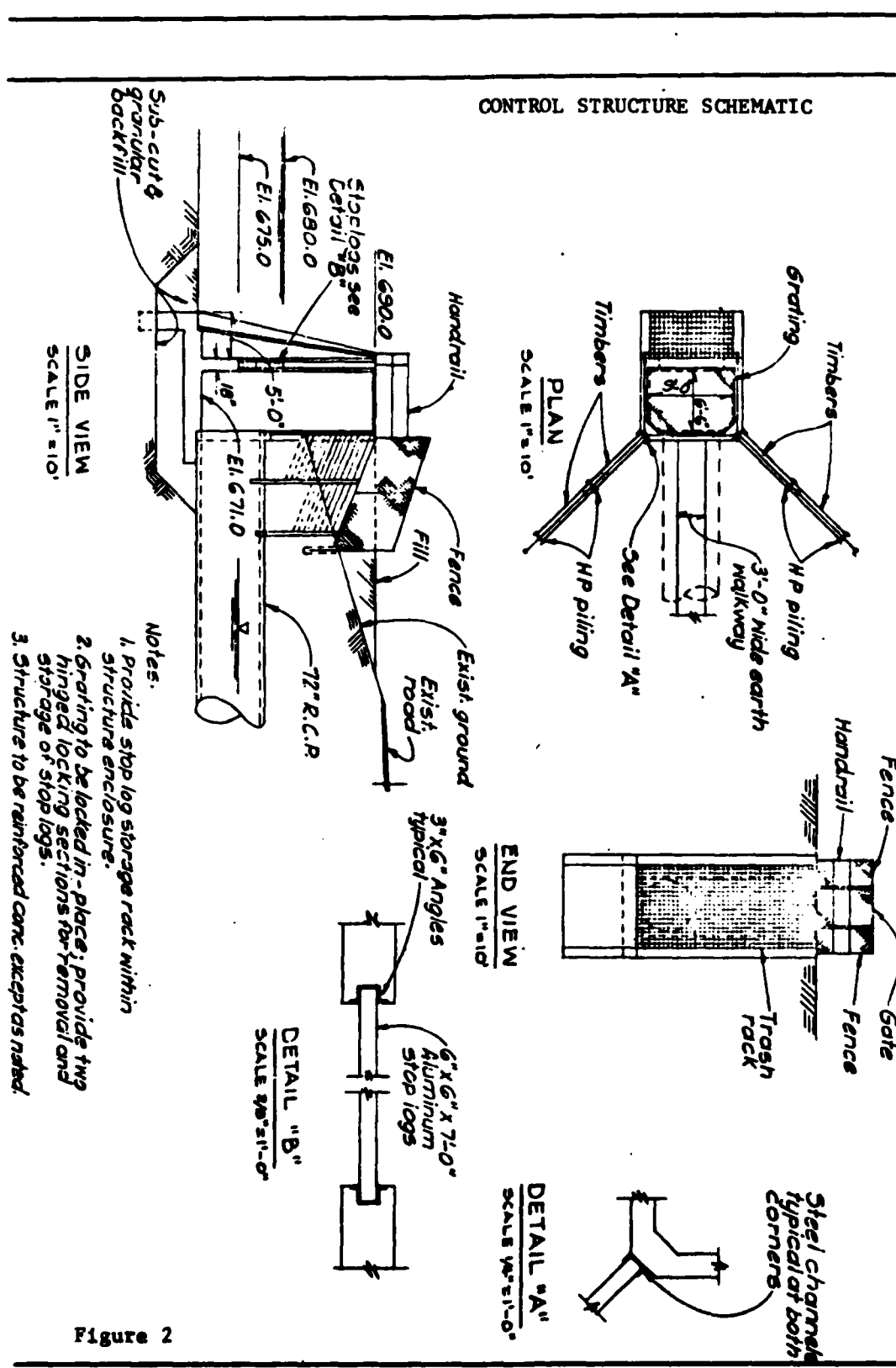
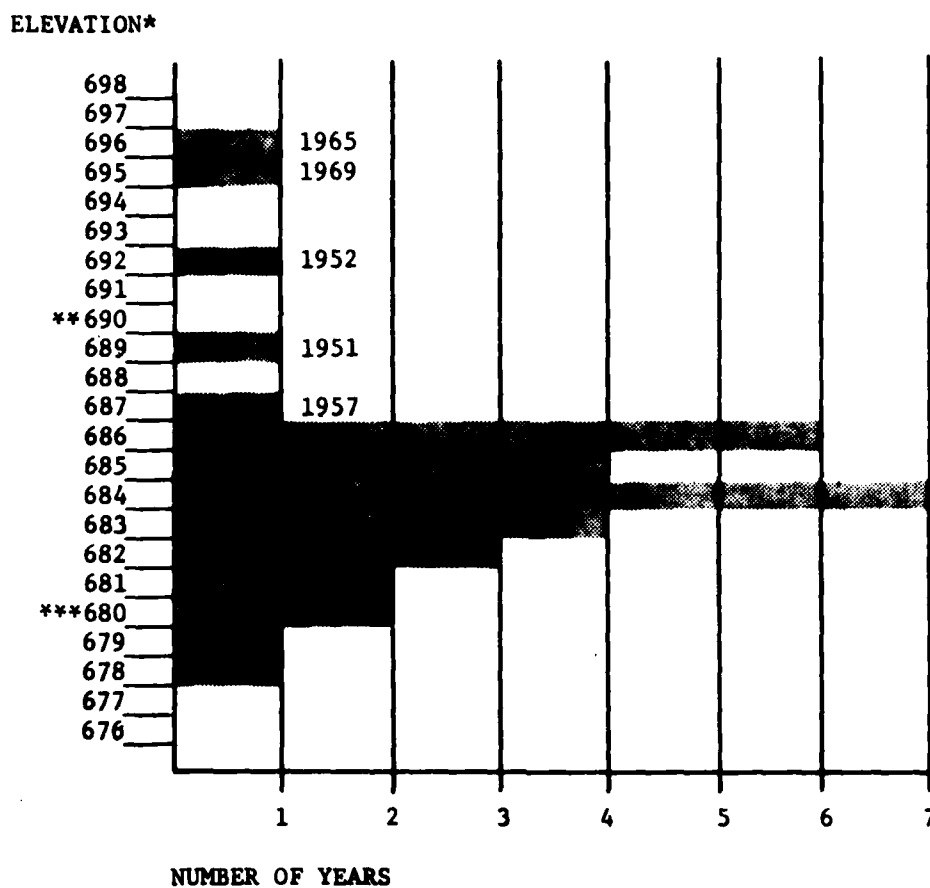


Figure 2

FIGURE 3

FREQUENCY OF MAXIMUM ELEVATION
LOCK AND DAM NO. 2 TAILWATERS 1939 - 1973



* Rounded to nearest foot.

** Maximum elevation of control with proposed control structure.

*** Proposed normal elevation of Lake Rebecca.

1.024 Mississippi River floodwaters would no longer back up into the lake until they reached the 690.0 elevation. As the quality of the water leaving Pool 2 of the Mississippi River is relatively low, prevention of its entry into Lake Rebecca should prevent water quality degradation in the lake.

1.025 Another aspect of controlling Mississippi River floodwaters is the protection of the recreational facilities from flood damage. The recreational facilities would be subject to flooding from interior drainage during high water periods on the Mississippi River. If interior flooding reaches elevation 686.0 (proposed elevation of the recreation structures), the city would be required to pump Lake Rebecca water over the road to protect the recreational facilities or accept the damage as part of maintenance costs. The structures are designed to be relatively flood damage free. If they were flooded, they would require clean-up of silt, debris, etc., deposited by the floodwaters.

Lake Raise

1.026 Currently the elevation of Lake Rebecca is approximately 677.5. The elevation of the lake is maintained by a bedrock control on the outlet stream. After the bedrock control the stream drops down to 675.0 at the outlet to the Mississippi River. The lake would be permanently raised to 680.0. This would result in the flooding of 31 acres: approximately 22 acres at the upper end of the lake and 9 acres at the lower end of the lake (plate 2).

1.027 The purpose of the lake raise is primarily to provide for the five-foot vertical drop at the control structure. An ancillary function is to provide greater depth in the lake for habitat enhancement and aquatic plant control.

Fish Eradication and Restocking

1.028 This phase of the project would be carried out by the Minnesota Department of Natural Resources (DNR) with local and Corps assistance. The DNR would eradicate the existing fish population of the lake in late summer or early fall after the control structure is constructed and operable.

1.029 Prior to eradication, as many fish as possible would be salvaged from the lake either through promiscuous fishing, commercial contract, by DNR crews, or by some combination of these methods. The lake may also be lowered a few feet by pumping to concentrate the fish and facilitate the eradication procedure.

SECTION ONE

PROJECT DESCRIPTION

1.030 The fish would be eradicated by use of Rotenone. The toxicant would degrade to non-toxic compounds within a few days. The poisoned fish would not be fit for human use. They would be collected and disposed of in a sanitary landfill.

1.031 In a few weeks following eradication, the lake would be restocked with fingerling walleye (Stizostedion vitreum) and largemouth bass (Micropterus salmoides). The following spring, northern pike (Esox lucius) and bluegills (Lepomis macrochirus) would be stocked.

1.032 The walleye are not expected to reproduce but should grow fast in the lake and provide walleye fishing for a few years. Eventually the lake is expected to support a northern pike - largemouth bass - sunfish (Lepomis sp.) fishery. The DNR has indicated that catfish (Ictalurus punctatus) may be stocked to fill the niche normally filled by bullheads (Ictalurus sp.).

1.033 The management of the fishery would be the responsibility of the DNR. The DNR has indicated that the reintroduction of rough fish is probably inevitable but that periodic eradication/restocking efforts would be an acceptable burden if the fishery would sustain itself 5-7 years.

Aeration

1.034 Mechanical aeration equipment would be installed to alleviate the chronic winterkill problem in the lake. A "Helixor" system is proposed. A vandal-proof structure would be constructed on the east side of the lake to contain the electric motor and compressor necessary to pump air through the system. Polyvinyl chloride pipe would run from the compressor house to the "Helixor" units situated on the bottom of the lake.

1.035 It has not been determined how many "Helixor" units would be installed. The exact number will be determined during the final design phase of the project, following consultation with the DNR and the manufacturer.

1.036 In the past, winterkill conditions have become evident in the lake around 1 January. Thus, the aeration equipment would have to operate from around 1 December through ice-out.

Recreation Development

1.037 The following are the recreational facilities being proposed, as shown in plates 2 and 3.

- Sand Beach (3,000 sq. ft.)
- Change House/Restroom Building (36' x 36')
- Canoe/Boat Launch
- Bottom Shaping for Bank Fishing
- Pull-Through Parking Lot
- Picnic Tables, Grills, and Trash Receptacles
- Trails
- Utilities (Water, Sewer, Electric)
- Security Control (Gates, Lights, Fencing)

1.038 The majority of the project lands suitable for development are located between the Mississippi River and Lake Rebecca. In order to meet the dual objectives of providing day-use recreation facilities and retaining the natural character of the lake, three zones of recreational development are proposed.

1.039 The southern portion of the area would be the zone where most of the intensive-use recreational facilities would be developed, such as the canoe/boat launching facility, swimming beach, and picnicking facility. In the northern portion of the area the only facilities proposed are hiking and nature trails. The center portion of the area would be a transition zone to buffer the natural and developed areas. The only proposed facilities are hiking trails. This area is also the most likely site for the small facility to house the motor and compressor for the aeration system.

1.040 The lower end of the site, which would be flooded by the lake raise, would be cleared of all vegetation. As much of this area would only have 6 inches to 2 feet of water covering it, it is proposed to excavate the area with conventional earth-moving equipment to provide deeper water for boat and canoe access and bank fishing. It is estimated that approximately 69,000 cubic yards of material would be removed and used as fill material on the recreation area.

1.041 Most of the vegetation in the proposed recreation area would also be cleared. Scattered clumps of large healthy trees would be left to provide shade and for aesthetic purposes. The vegetation removed would either be sold and/or chipped to provide material for footpaths.

1.042 Only a small number of trees along the bluff-side bank would have to be removed, as the flooding would be minimal along this shoreline.

1.043 The vegetation at the upper end of the island would be left as is. Because of the relatively flat topography it is difficult to determine what the extent of die-off of trees would be. The proposal now is to allow the trees to die off from the flooding in the first two to three years after the lake raise. At that time a decision can be made among all Federal, State and local interests involved as to the disposition of the dead trees or whether they should be removed at all.

1.044 Following land-clearing and bottom-contouring, the structural recreational facilities as depicted in plate 3 would be constructed.

1.045 The swimming beach would be located on the lower east end of the lake. A crescent-shaped area would be excavated and clean sand trucked in for the beach. The excavated material would be used as fill in the recreation area.

1.046 The canoe/boat launch facility would be constructed at the southernmost end of the site, along with a parking area. This facility would provide the public free access to the lake. A gravel back-in boat ramp would be provided for operation, maintenance, and enforcement purposes; but this would not usually be open to the public.

1.047 An access road and the major parking area would be constructed in the center of the recreation site. All road surfaces and the parking lots would be gravel. A gate would be constructed at the entrance to the facility.

1.048 A combination change house/restroom would be constructed near the beach. The restrooms would have concrete vaults for sewage containment that would have to be pumped out by commercial operators.

1.049 The picnic grounds would be constructed in the area between the main parking lot and the newly-flooded area. Standard facilities such as tables, grills and trash receptacles would be provided.

Powerline Relocation

1.050 The 69kV transmission line that passes over the proposed beach area must be moved for safety reasons. Approximately 4000 feet of line would be removed and relocated as shown in plate 2. The line would continue down the road to L/D 2, turn west and follow the property line of the Koch Refining Company, pass through the center of the transition zone, cross the lake where it now does, and connect with the existing line going up the bluff on the west side of the lake.

1.051 A 40-foot right-of-way would be cleared along the Koch property line and a 75-foot right-of-way would be required through the Federal property. The existing poles in the lake would be removed and the lake crossed in a single span.

1.052 Northern States Power Company concurs in the proposed relocation route and will design and construct the new powerline. They have indicated a willingness to absorb part of Hastings' financial share of this relocation. Plantings which provide food and cover for wildlife, while not interfering with the powerline, would be done in the Federal property right-of-way.

Bottom Shaping

1.053 When the lake is raised to elevation 680, the surface area will be increased from 41 acres to approximately 72 acres (plate 2). Without any modification to the bottom, much of the area adjacent to the proposed recreation area would be less than 1 foot deep. Consequently, it is proposed to reshape this area to increase the depth, enhancing fishery habitat, bank fishing potential, and the visual quality of this area. The material, which would be removed by bulldozer, front-end loader, and dragline, would be placed in the recreation area. Disposing of the material in this manner is advantageous because it would be used to elevate the recreation area several feet above the lake, minimizing the potential of flooding the facilities during periods of high water. Based on current estimates, approximately 69,000 cubic yards of material would be moved during the reshaping efforts.

REAL ESTATE

1.054 The Lake Rebecca project would involve no relocations of residences or businesses. However, 23 acres of flowage easements are necessary to the objectives of the project and its long-term operation and maintenance (plate 2). The city of Hastings would obtain all land easements necessary; no credit for these features is given in the cost-sharing calculations. In addition, scenic zoning (to be accomplished by the city) is proposed to protect the visual quality of the area.

1.055 Flowage easements would be acquired on lands from elevation 677.5 to 691. This would be required because project structures would only control possible flooding from the Mississippi River to elevation 690. Flowage easement policy excludes the construction of permanent structures such as boathouses or other attached private recreational facilities. These easements would relieve the project sponsor from liabilities to private owners in the eventuality of any future inundation in these areas. If the project were at some time dismantled, the easement would return to the respective property owners.

1.056 The purpose of the suggested scenic zoning is to retain the existing visual quality of the area and prevent the development of negative man-made intrusions. Scenic zoning of approximately 40 acres would allow the City Council the opportunity to review proposed developments that would significantly alter the vegetative cover or that would propose structures that could be visible from Lake Rebecca.

Construction Cost Estimates, Allocation and Apportionment

1.057 The city of Hastings, by participating with the Corps of Engineers in development of this project, is eligible to receive Federal funds for certain aspects of this project. Costs for recreation development would be shared equally (50-50); the city and the Federal Government would each assume 50 percent of the construction costs. For fish and wildlife enhancement features, costs are generally shared on a 75-25 basis. Here, the city would assume 25 percent of the construction costs. In both cases, the city must agree to operate, maintain, and replace the constructed facilities. The construction costs and cost apportionment of each project item are summarized in table 1. In addition, the Federal Government has no general authority to acquire additional lands, easements, or rights-of-way at existing water resource projects. Consequently, the non-Federal sponsor (the city of Hastings) must provide all additional easements required to develop the project.

1.058 Operation and Maintenance Costs - The Water Resources Council has established regulations (Principles and Standards - Federal Register, 10 September 1973) which direct the Corps of Engineers to conduct project benefit/cost economic analyses for all water-related projects under consideration. These regulations require that all projects attempt to assure a return on benefits of \$1.00 for every \$1.00 spent on the project. The cost side of the ledger for the Lake Rebecca project includes both the first costs or construction costs shown in table 1, and estimated annual costs necessary to operate and maintain project facilities (table 2).

1.059 Project Benefits - The benefits accruing to the public from construction of the project are figured by estimating the public's "willingness to pay" for the new recreational opportunities that will be provided by the project. Since it is impossible to fully document what the average project user is willing to pay, a hypothetical day-use value is carefully estimated and applied to the annual project visitation projection to determine project benefits. A synopsis of the benefits is presented in table 3.

SECTION ONE

PROJECT DESCRIPTION

TABLE 1:
CONSTRUCTION COSTS

Item	Total Cost	Federal Cost	Non-Federal Cost
Dike	184,800	138,600	46,200
Control Structure	40,000	30,000	10,000
Power Line Relocation	100,000	50,000	50,000
Aerators	6,500	4,600	1,900
Recreation Facilities	233,900	117,000	116,900
Bottom Shaping	103,500	77,600	25,900
SUBTOTAL	668,700	418,100	250,600
Contingency 15%	100,300	62,700	37,600
SUBTOTAL	769,000	480,800	288,800
Engineering & Design 10%	76,900	48,100	28,800
Supervision, Administration, & Inspection 4.5%	34,600	21,600	13,000
Overhead	11,700	7,300	4,400
SUBTOTAL	892,200	557,800	334,400
¹ Real Estate	13,200	-	13,200
² Fish Eradiction & Restocking	3,300	-	3,300
TOTAL	908,700	557,800	350,000

¹ Total Cost Assumed by Local Sponsor.² Minnesota Department of Natural Resources would carry out this portion of the project.Table 2
Estimated Annual Operation, Maintenance and Replacement Costs

<u>Item</u>	<u>Estimated Annual Cost</u>
Recreation Area O&M (.20/recreation day)	19,000
Aeration Equipment	1,300
Lake Control Structure	150
Lake Fish Restocking	60
Misc. Equipment & Material Replacement	600
TOTAL	21,110

SECTION ONE

PROJECT DESCRIPTION

Table 3
Project Benefits

Estimated average annual project visitation ¹	90,200 recreation days
Day-use value ²	\$1.75
Average annual benefits ³	\$144,400

¹ Visitation reflects maximum use capacity of the project to be obtained by the third full year of operation..

² The medium-range day-use value was based on a professional review of project features which included such variables as project access to area population centers, quality of project aesthetic features, combination of opportunities to be provided, and quality of facilities and resources to be developed.

³ Amortized over 50 years (the project's economic life) at 6-3/8 percent interest rate.

1.060 Benefit/Cost Ratio - To compare costs to benefits, all project costs must first be spread over the economic life (50 years) of the project in the same fashion as the benefits. Project construction costs are amortized and added to project annual operation and maintenance (O&M) costs to estimate total project annual costs. The annual project cost is \$81,800. Consequently, estimated benefit-to-cost ratio is as shown in table 4.

Table 4
Project Benefit/Cost Ratio

First Cost	908,600
Amortized	<u>.06679</u>
	\$ 60,700
First Cost	60,700
Annual O&M Cost	<u>21,100</u>
Average Annual Cost	81,800
Benefit/Cost Ratio:	
Ave. Annual Benefit	<u>144,400</u>
Ave. Annual Cost	81,800 = 1.77
Benefit/Cost Ratio	1.77 : 1.00

2.000 ENVIRONMENTAL SETTING

WATERSHED

2.001 Lake Rebecca has a relatively small watershed. The total drainage area of the lake is approximately 718 acres (figure 4). Of this total, 314 acres drains via a storm sewer into the lake's outlet stream. The remaining 404 acres drains to the lake via overland flow.

2.002 The 314-acre tract drained by the storm sewer is primarily residential with some commercial development along U.S. Highway 61. The drainage area on the west side of Lake Rebecca includes a hospital grounds, a cemetery, some residences and the wooded bluff. The east side of the lake is entirely wooded, save for some wetlands and the Koch Company tank farm.

GEOLOGY

2.003 Lake Rebecca lies in the floodplain of the Mississippi River. Figure 5 is a geological cross section from west to east. The Oneota dolomite forms the bluff on the landward side of the lake while the island separating the lake from the river is made up of alluvial deposits.

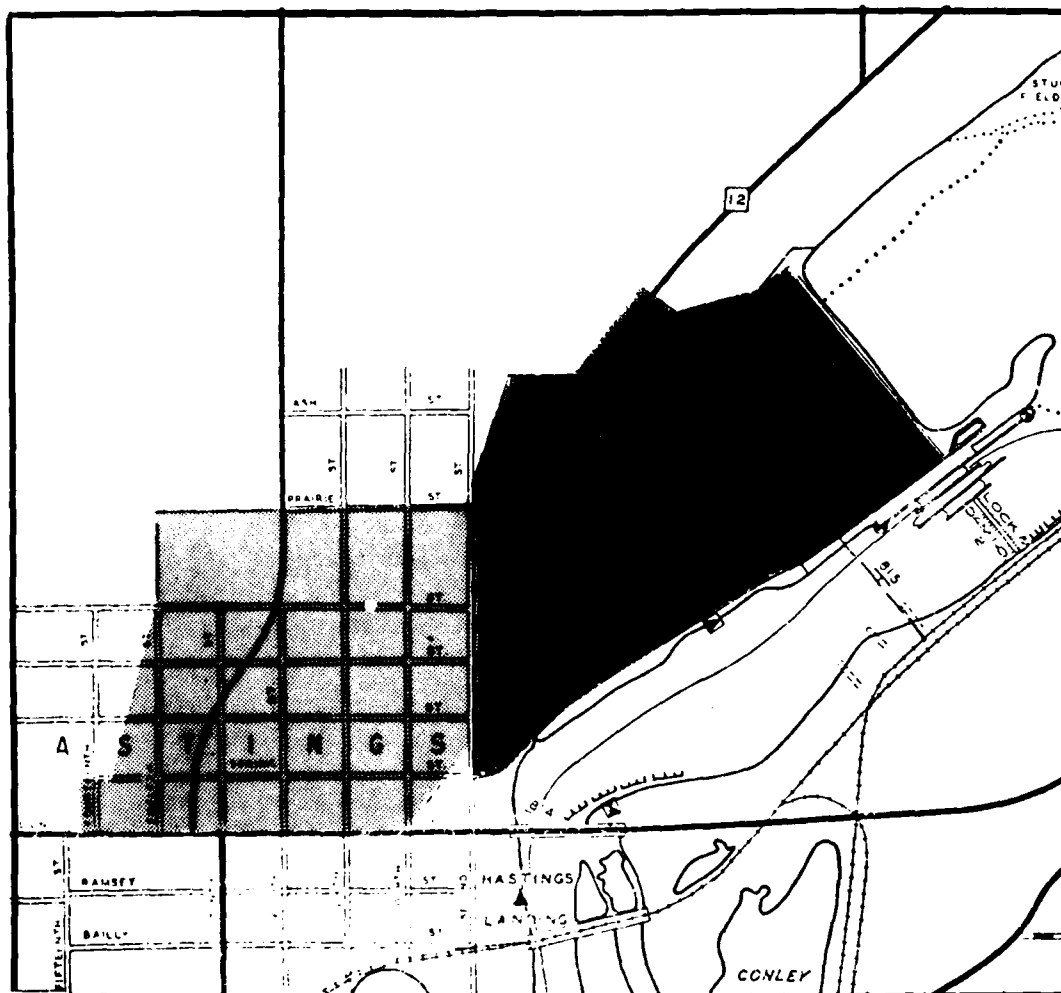
SOILS

2.004 The soils on the island have not been mapped or classified. On the surface they appear to be the typical sands and silts found on the Mississippi floodplain that have been deposited by floods. Much of the island was covered by sand and silt dredged material in the 1940's.

LAKE SEDIMENTS

2.005 Core samples were taken from the lake bottom at five different locations. The samples show the lake sediments to be made up primarily of a soft, moist, grey silty clay. Sediment samples were analyzed; the results are depicted in table 5.

FIGURE 4:
LAKE REBECCA DRAINAGE AREA



STORM SEWER DRAINAGE AREA - 314 ACRES



OVERLAND DRAINAGE AREA - 404 ACRES

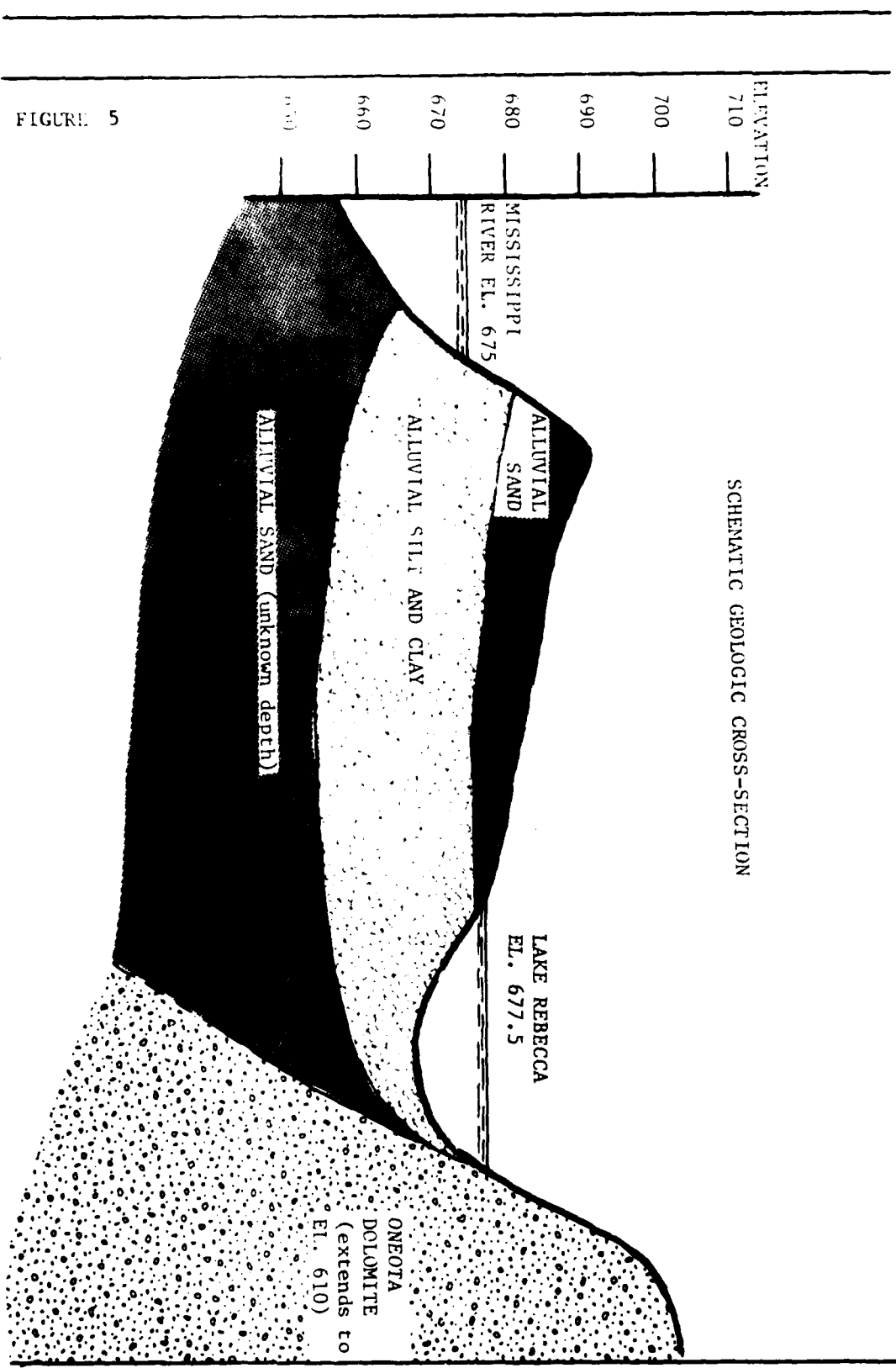


FIGURE 5

SECTION TWO

ENVIRONMENTAL SETTING

Table 5
Sediment Analysis¹

Parameter	Samples	Mean	Range
Total Volatile Solids %	11	7.83	3.47-10.75
Chemical Oxygen Demand mg/kg	11	78,280	36,000-110,000
Total Kjeldahl Nitrogen mg/kg	11	2,390	940-3,900
Oil and Grease mg/kg	11	1,340	110-3,000
Phosphorus mg/kg	11	726	294-1,300
Total Solids %	11	45.59	32.35-65.74
Mercury ² ug/g	11		< 0.01-0.17
Lead ug/g	11	22.0	7.2-42.4
Zinc ug/g	11	76.3	35.0-111
Cadmium ² ug/g	11		.2-1.08
Copper ug/g	11	44.1	14.0-75.6
Nickel ug/g	11	29.2	23.0-34.0
Chlorinated Hydrocarbons ² ug/g	11		< .050

¹ 9 samples analyzed by one laboratory, 2 by another laboratory

² Means not calculated because some results reported as "less than"

SECTION TWO

ENVIRONMENTAL SETTING

2.006 In addition to the parameters above, arsenic, chromium, and polychlorinated biphenyls (PCB's) were also analyzed for. They were not included in the table, as the results submitted by the two laboratories differed markedly. These results are shown below.

	Samples	Arsenic ug/g range	Chromium ug/g range	PCB ug/kg range
Laboratory A	9	< 0.01-0.03	198-420	65-660
Laboratory B	2	6.10-12.00	9.1-18	< .4

2.007 It is assumed that the results for arsenic and chromium as submitted by Laboratory B are more likely correct, as those figures are consistent with results obtained in the testing of Mississippi River sediments on other Corps projects.

2.008 New sediment samples were taken (figure 6) to retest for PCB's with replicate samples submitted to the laboratories and the U.S. Geological Survey (USGS) for analysis. The results are shown below.

	Sample #		
	11	22	33
U.S.G.S.	8 ug/kg	0	1 ug/kg
Laboratory A	-	30 ug/kg	-
Laboratory B	38 ug/kg	-	-

2.009 From the analysis completed, the sediments in Lake Rebecca contain relatively high levels of organic pollutants and oil and grease with some PCB's also present.

2.010 In December 1970 the oil pipeline running along the dike at the north end of Lake Rebecca broke, spilling 100,000+ gallons of oil onto the ice. Most of the spill was cleaned up but oil is still readily evident in the surface sediments in the northern one-fourth of the lake.

HYDROLOGY

2.011 No detailed hydrologic models have been developed for Lake Rebecca. However, based upon available information, water enters Lake Rebecca via:

- a. Direct Precipitation
- b. Overland Runoff
- c. Storm Sewer Discharge

- d. Groundwater Flow
- e. Seepage from the Mississippi River
- f. Mississippi River Floodwaters

and leaves via:

- a. Evaporation
- b. Outlet Stream Discharge

2.012 Direct precipitation falls on the surface of Lake Rebecca in the form of rain, snow, hail, etc. Annual precipitation in Hastings is approximately 25 inches with 16 inches falling during the period May through September.

2.013 Overland runoff comes from 404 acres on the river and bluff sides of the lake as shown in figure 4. A storm sewer discharges into the outlet stream about 800 feet upstream of the outlet through the L/D 2 access road. This storm sewer drains 314 acres of Hastings. It is estimated that the storm sewer discharges about 300 acre-feet of water per year.

2.014 Groundwater flows enter the lake on the bluff side with the Oneota Dolomite being the aquifer. Numerous springs and seeps are evident along the western edge of the lake. Enough seepage occurs such that the lake does not freeze tight to the shoreline in the winter. One spring is large enough to keep the outlet stream open throughout the winter. Borings taken in 1927 indicated that the groundwater under the island is under artesian pressure.

2.015 Seepage through the L/D 2 from the Mississippi River also enters the lake; however, the exact entry point is unknown. Relatively impervious alluvial deposits underlie the lake and the island, and a sheet piling core down to elevation 649.7 is found in the section of the dike across the top of Lake Rebecca and down to elevation 664.7 along the rest of the dike. It is believed that some minor seepage occurs along the entire dike but with most of the seepage originating through the dike in the large wetland area on the north end of the island.

2.016 Enough water moves from this direction towards Lake Rebecca to enable beaver to construct a dam across one of the sloughs leading to Lake Rebecca. This dam has about a 1-foot head and ponds about 2 acres of water.

2.017 Mississippi River floodwaters back up into the lake every time the tailwaters of L/D 2 reach elevation 677.5. This is an almost annual occurrence.

WATER QUALITY

2.018 The water quality of Lake Rebecca is relatively poor from an aesthetic viewpoint because of carp-induced turbidity and planktonic algal growth, which greatly reduce water clarity. The algal population of the lake has not been analyzed. However, no nuisance forms such as filamentous algae have been noted.

2.019 From a chemical standpoint, Lake Rebecca is a nutrient-rich, hard-water lake. Water quality samples were taken in the lake on three dates in the summer of 1976 to gather basic information on the characteristics of the lake. Samples were taken on three dates (June, July and August) at three sites, 2 feet below the surface and 1 foot above the bottom of the lake. Table 6, below, summarizes the data collected.

Table 6

Parameter	# Samples or Readings	Mean	Range	Minn. Water Quality standards ⁶
Secchi Disk (m)	9	.4	.4-.5	N/A
BOD ₅ (mg/l)	18	6.8	4-10	N/A
pH	18	8.3	7.8-8.8	6.5-9.0
Suspended Solids (mg/l)	17	34	21-98	N/A
Specific Conductance (umho at 25°C)	18	446	400-500	N/A
Total Alkalinity (mg/l as CaCO ₃)	18	188	164-206	N/A
Ammonia ¹ (mg/l as N)	18	-	<.10-.70	1.0
Nitrates ² (mg/l as N)	18	.20	<.10-.60	N/A
Total Phosphorus (mg/l as P)	18	.26	.13-1.5	N/A
Ortho Phosphorus (mg/l as P)	18	.036	<.01-.10	N/A
Oil ⁴ (mg/l)	18	-	< 1-5	0.5
Phenol (mg/l)	18	-	< 0.002-0.004	0.01
Total Chromium (mg/l as Cr)	18	-	< 0.05	0.05
Copper (mg/l as Cu)	18	-	< 0.05	0.01
Fecal Coliform ⁵ (no./100 ml)	18	36	< 20-200	200

¹ 14 of 18 samples were <.10

² 5 samples with <.10 results were used as .10 in calculation of the mean

³ 4 samples with <.01 results were used as .01 in calculation of the mean

⁴ 14 of 18 samples were <1

⁵ 10 samples with <20 results were used as 20 in calculation of the mean

⁶ WPC 14.

SECTION TWO

ENVIRONMENTAL SETTING

2.020 In addition to the parameters in the table, dissolved oxygen (D.O.) and chlorophyll A were also sampled. Surface D.O.'s ranged from 11.0 to 14.2 mg/l while D.O.'s taken 2 feet below the surface ranged from 8.4 to 12.4 mg/l. Bottom D.O. readings ranged from 2.8 to 9.1 mg/l. D.O. gradients were evident at all but one site on one occasion.

2.021 Chlorophyll A values ranged from 0.73 to 1.4 mg/m³ on 22 June, using a 80-micron plankton net for sampling. At the later samplings a Van Dorn sampler was used 2 feet below the surface. The results from these samplings ranged from 77 to 136 mg/m³. These results indicate low phytoplankton levels in June and high levels in July and August. These results may be biased somewhat by the change in collecting methods from the June to the later samplings.

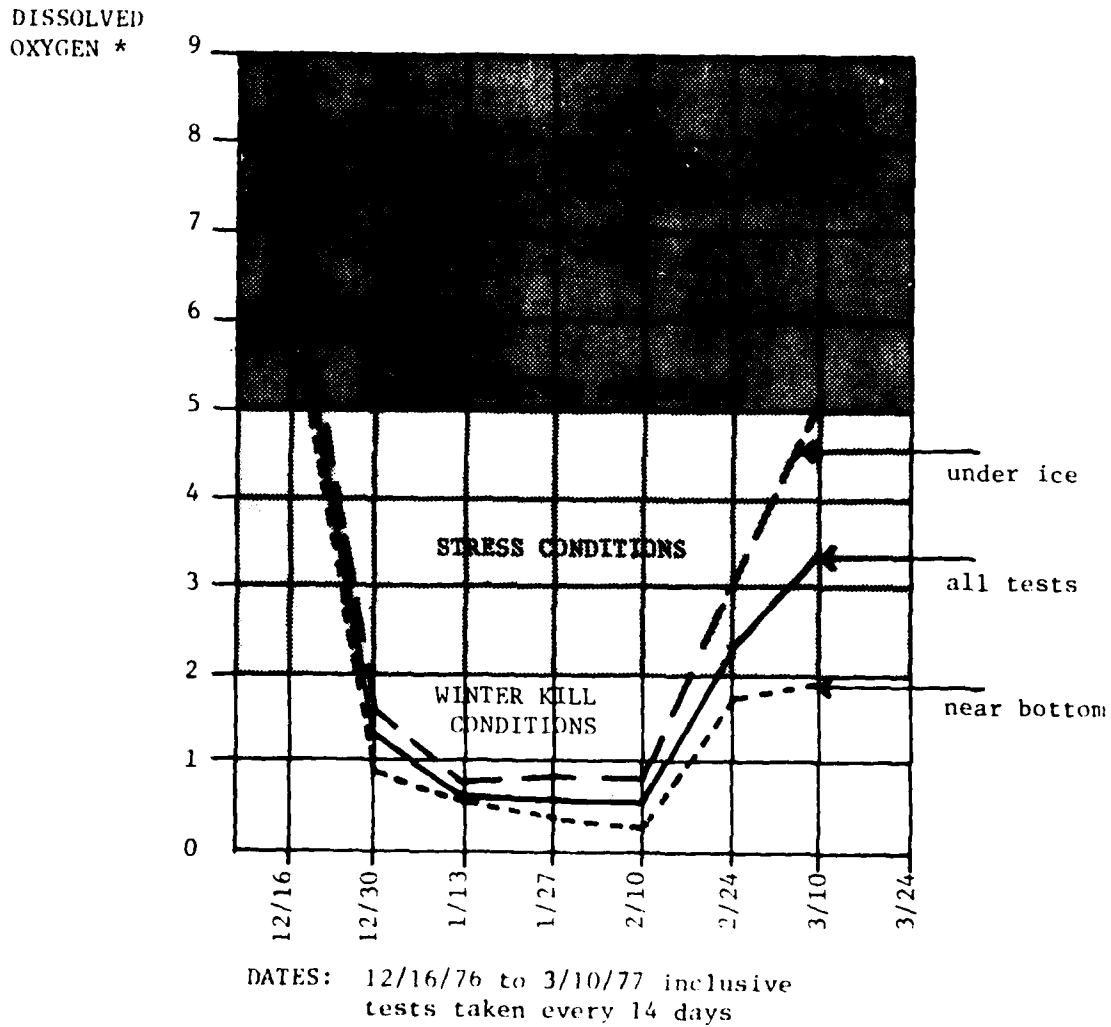
2.022 The table below gives water quality data for the Mississippi River taken at L/D 2.

Table 7

Parameter	# Samples	Period (years)	mean	Range
BOD ₅ (mg/l)	98	1958-1976	5.9	1.1-16.0
pH	98	1958-1976	7.8	7.0-9.0
Specific Conductance (umho at 25° C)	56	1967-1976	432	270-620
Total Alkalinity (mg/l as CaCO ₃)	57	1967-1976	177	100-220
Ammonia - N (mg/l)	87	1966-1976	.66	.01-2.70
Nitrate - N (mg/l)	66	1958-1976	1.25	.02-6.1
Total - P (mg/l)	85	1958-1976	.37	.02-1.10
Phenols (ug/l)	13	1974-1976	7.42	2.00-29.00
Chromium (ug/l)	13	1974-1976	6.89	.50-16.0
Copper (ug/l)	50	1971-1976	14.18	100-110.0
Fecal Coliforms (no./100 ml)	68	1964-1976	2549	20-33000

FIGURE 6

DISSOLVED OXYGEN LEVELS IN LAKE REBECCA
WINTER OF 1976-1977



* In parts per million (PPM)

2.023 In comparing the Lake Rebecca and Mississippi River data, the results are quite similar for those parameters more dependent upon physiogeologic factors such as pH and alkalinity. The Mississippi carries a higher nitrogen load but total phosphorus is comparable. The most marked difference is with the parameter of fecal coliform, as the Mississippi River mean is well above the Minnesota Health Department standard of 200/100 ml.

2.024 One of the major problems with Lake Rebecca is that it is subject to chronic winterkill. In 26 of the last 33 winters, the lake has had at least a partial winterkill. Over the 1976-1977 winter the Minnesota DNR monitored the D.O. levels in the lake. The D.O. levels were monitored at 8 stations and the results are shown in figure 6.

2.025 As can be seen from the graph, by 30 December 1976 the D.O. levels in the lake were below 2.0 mg/l and they stayed there until late February. Lake Rebecca probably does not totally winterkill as the springs entering the lake do keep some area of the outlet stream open and the lake does not freeze tight to the shoreline because of seepage. Some hardier sportfish such as northern pike and crappies survive, but more sensitive species such as largemouth bass and bluegill undoubtedly suffer severely.

VEGETATION

2.026 The vegetation in the project area can be divided into three distinct types, an upland deciduous forest on the bluff side of the lake and the floodplain forest and marshland on the island side of the lake.

2.027 The vegetation on the bluff side of the lake can be characterized as mature upland hardwood with an understory varying in density from sparse to moderately dense.

2.029 The predominant tree species on the bluff side are oak (Quercus sp.), ash (Fraxinus sp.) elm (Ulmus sp.) and basswood (Tilia americana) with some scattered hemlock (Tsuga canadensis). There is one relatively open area that has scattered red cedar (Juniperus virginiana) dominating.

2.030 The major portion of island separating Lake Rebecca from the Mississippi River is forested. Much of this area is a typical floodplain forest with small areas higher in elevation that exhibit vegetation patterns more typical of upland conditions. There are sloughs along the upper east side of the lake and a large marsh at the northern end of the island.

2.030 Plate 1 contains a general vegetative cover map. The following is a discussion of the various cover types shown on the map.

2.031 Area A - This area is a typical floodplain forest with a dense overstory of predominantly cottonwood (Populus deltoides), black willow (Salix nigra), silver maple (Acer saccharinum) and American elm (Ulmus americana). There is little or no cottonwood reproduction. Most pole-sized trees are silver maple, American elm, and black ash (Fraxinus nigra). Ground cover varies from non-existent in places to lush in others, with Virginia creeper (Parthenocissus quinquefolia), mint (Labiatae), jewelweed (Impatiens capensis) and nettle (Urtica dioica) being some of the more common ground species.

2.032 Area B - This area has a canopy similar to Area A but has a dense shrub and ground layer. The area appears to be slightly higher in elevation than Area A which probably accounts for the more profuse undergrowth. Prickly ash (Zanthoxylum americanum) and ironwood (Ostrya virginiana) are common in this area.

2.033 Area C - Area C is predominantly covered by a dense stand of pole-sized black willows with little understory.

2.034 Area D - Area D is a more open area covered by medium-sized cottonwoods. Reproductive tree growth primarily consists of cottonwoods and oaks (Quercus sp.). The ground cover is more typical of semi-open areas with species such as goldenrod (Solidago sp.), daisy fleabane (Erigeron annuus) and heal-all (Verbena hastata) being common.

2.035 Area E - Area E is a small area of very large cottonwoods with little or no understory.

2.036 Area F - The scattered areas labeled F are dense willow (Salix sp.) thickets.

2.037 Area G - Area G is a cleared area that was intended to be a softball field at one time. Scattered grasses and herbs now grow there.

2.038 Area H - The areas labeled H are sloughs lying adjacent to the lake. These areas would be classified as Type II-III wetlands (U.S. Fish and Wildlife Circular 39). The most predominant species in these sloughs is rice cutgrass (Leersia oryzoides) with some cattails (Typha sp.), sedges (Carex sp.), swamp milkweed (Asclepias purpurascens) and beggartick (bidens sp.) present.

2.039 Area I - Area I is a large marsh on the northern end of the island that appears to be fed by seepage through the dike. It grades from a Type II to a Type IV wetland from east to west. The wetland is a mosaic of small solid stands of different wetland species. The more common species found are swamp milkweed, sedges, cattails, beggarticks, and arrowhead (Sagittaria latifolia). During years of normal precipitation, open water is present during the entire March-November season. Even in 1976, a very dry year, there was a small area of open water during the entire season.

WILDLIFE

2.040 No specific wildlife surveys have been conducted on the project area although observations have been noted by Corps personnel whenever they have visited the area.

2.041 Because of the nature of the area it is felt that there is a very diverse fauna utilizing the area but population levels of individual species are probably low. The following is a synopsis of the value of the habitat on the site with notes on sightings.

2.042 Large mammals: The island has habitat value for white-tailed deer (Odocoileus virginianus) in the form of cover and browse. However, because of its small size and limited access the area is probably used only occasionally by a few animals. Deer tracks have been observed along the marsh on the upper end of the island.

2.043 Furbearers: The island provides good habitat for a number of furbearers. Beaver (Castor canadensis), muskrat (Ondatra zibethica), and raccoon (Procyon lotor) sign are readily evident in the area. Muskrat sign (houses and tracks) have been observed in the marsh at the north end of the island. Raccoon sign (tracks) have been observed in the marsh and along the lakeshore.

2.044 In the summer of 1976, beaver constructed a partial dam on the outlet stream and across one of the backwater areas on the upper east side of the lake. Bank dens and tree cuttings were also evident. In 1977, beaver constructed a dam with about a 2-foot head across the outlet stream. The beaver have been observed and appear to be relatively accustomed to human intrusion into their domain. They do not display the typical shyness of beaver found in more rural areas.

2.045 The island probably is used by smaller furbearers such as mink (Mustela vison) and weasels (Mustela sp.) though no observations of these species or their sign have been made.

2.046 Small Mammals: The area undoubtedly provides habitat for a number of small mammal species. Gray squirrel (Sciurus carolinensis) and cottontail rabbits (Sylvilagus floridanus) have been observed on the site. Other species probably present include:

masked shrew	<u>Sorex cinerus</u>
shorttailed shrew	<u>Blarina brevicauda</u>
common mole	<u>Scalopus aquaticus</u>
eastern chipmunk	<u>Tamias striatus</u>
meadow vole	<u>Microtus pennsylvanicus</u>
meadow jumping mouse	<u>Zapus hudsonius</u>
striped skunk	<u>Mephitis mephitis</u>

2.047 Waterfowl and Wading Birds: Waterfowl have been frequently observed at the lake. The marsh and backsloughs of the lake provide very good nesting and rearing habitat, and feeding habitat for puddle ducks. Waterfowl observed at Lake Rebecca include mallard (Anas platyrhynchos), bluewinged teal (A. discors), wood duck (Aix sponsa) and coot (Fulica americana). In July 1976 a hen mallard with six young were observed on the northeast part of the lake.

2.048 A number of wading birds have been observed at the lake, including great blue heron (Ardea herodias), American egret (Casmerodius albus), green heron (Butorides virescens), and blackcrowned night heron (Nycticorax nycticorax). No nesting of these birds has been observed on the island. The individuals observed may have been from the rookery at Pig's Eye Lake in St. Paul or from a rookery located about 5 miles downriver from L/D 2.

2.049 Gamebirds: A single ruffed grouse (Bonasa umbellus) was observed on the bluff side of the lake in May 1976, while a pair of pheasants (Phasianus colchicus) were occasionally observed along the dike on the north end of the lake. The value of the habitat on the site for gamebirds is low.

2.050 Songbirds: Sixteen species of songbirds were observed on the island and around the lake in the summer of 1976. These were casual observations and there are probably many more species using the area because of the diversity of habitat present. The Mississippi River valley is rich in birdlife, primarily because it is the main stem of the Mississippi flyway and within an area of overlapping eastern and western ornithological ranges.

2.051 Threatened or Endangered Species: No threatened or endangered species of flora or fauna are known to exist in the project area (exhibit 1).

AQUATIC BIOTA

2.052 Invertebrates: Benthic invertebrate populations in Lake Rebecca are low primarily because of the activity of the rough fish, continuously stirring up the soft silty bottom.

2.053 In June 1976, dredge grab samples were taken from different areas of the lake. Visual examination of the sediments revealed few invertebrates and little detritus. Analysis of eight samples showed the benthic invertebrate population to be primarily fresh-water worms (Tubificidae) and dipteran larvae (Ceratopogonidae and Chironomidae). In fact the only non-oligochaete or non-dipteran organisms found were a few snails (Amnicola sp.)

2.054 A number of qualitative samples were taken from the few littoral areas present in the lake on the upper east shore. These samples yielded a greater variety of organisms including: 2 genera of Mollusca, 3 species of Crustacea, and 16 genera of Insecta.

2.055 Fish: The fish population in Lake Rebecca is dominated by rough fish. However, a number of other species are present as the lake is stocked by fish entering from the Mississippi River. Lake Rebecca reportedly had a good quality fishery in the 1930's but in the 1940's began to winterkill and became dominated by rough fish.

2.056 Since 1944, when the Minnesota DNR began keeping records, the lake has winterkilled 26 out of 33 winters.

2.057 In 1974 the DNR surveyed the lake via seining and electrofishing. The results of this survey were:

Shoal Water Seining

<u>Species</u>	<u>No. Caught</u>
Yellow perch (<u>Perca flavescens</u>) (young-of-the-year)	3
(others)	16
Black crappie (<u>Pomoxis nigromaculatus</u>) (young-of-the-year)	7
Bluegill (<u>Lepomis macrochirus</u>) (young-of-the-year)	38
(others)	3
Northern pike (<u>Esox lucius</u>) (young-of-the-year)	1
Gizzard shad (<u>Dorosoma cepedianum</u>) (young-of-the-year)	3
Log perch (<u>Percina caprodes</u>)	1

SECTION TWO

ENVIRONMENTAL SETTING

Electro-Fishing

<u>Species</u>	<u>No. Caught</u>	<u>Size Range</u> (inches)
Northern pike	4	7.0-11.4
Walleye	3	7.5-13.9
Largemouth bass (<u>Micropterus salmoides</u>)	12	3.0-11.9
White bass (<u>Morone chrysops</u>)	4	3.0-4.9
Black bullhead	11	5.5-8.9
Carp	79	8.5-22.9
Bigmouth buffalo	4	14.0-15.9
White sucker	12	6.5-17.9
Gizzard shad	308	2.0-4.9
Quillback carpsucker (<u>Carpoides cyprinus</u>)	1	12.0-12.9
Black crappie	9	6.5-10.9
White crappie	1	11.5-11.9
Bluegill (adult)	55	3.0-7.4
(young-of-the-year)	32	.50-.75
Pumpkinseed (<u>Lepomis gibbosus</u>)	5	3.5-5.4
Green Sunfish (<u>Lepomis cyanellus</u>)	1	4.0-4.5
Yellow perch	77	2.0-6.4
Bluntnose minnow (<u>Pimephales notatus</u>)	1	N.A.

2.058 In October 1976 fish were collected via electrofishing to run a PCB (polychlorinated biphenyl) analysis on the fish in the lake. Species were only collected until enough to make a sample were obtained. However, a visual estimation of the relative frequency of species "turned" by the electrodes is as follows:

Carp	Abundant
Gizzard shad	
(young-of-the-year)	Abundant
Bigmouth buffalo	Common
Northern pike	Present
Bluegill	Present
Black crappie	Present
Largemouth Bass	Present

The results of the PCB analysis are as follows:

<u>Sample</u>	<u>ug/gm PCB (aroclor 1254)</u>
Composite of 11 carp fillets from 13- to 18-inch fish	.209

Composite of 10 northern pike filets from 5 12- to 20-inch fish	.356
Composite of 15 bluegill sections from 3- to 5-inch fish	.370
Composite of 49 gizzard shad sections from young-of-the-year fish	.238

2.059 PCB's accumulate in the fatty tissues of fish and it has been found that fish with a high fat content such as carp, white bass, buffalofish, and catfish have higher PCB levels than low-fat fish such as northern pike and walleye.

2.060 As fish can move freely from Lake Rebecca to the Mississippi River and back, it was expected that the analysis of Lake Rebecca fish for PCB content would reveal little unless some unusual results were obtained. The results for the northern pike and bluegill samples were comparable to those obtained from low-fat fish from the Mississippi River in 1975. The levels in the carp from Lake Rebecca were low when compared to a Mississippi River high-fat fish analysis in 1975 and also are low when compared to the low-fat fish in Lake Rebecca. There is no known explanation for this anomaly.

2.061 Gizzard shad are a high-fat fish and it would be expected that adults would contain relatively high levels of PCB's. However, the young-of-the-year gizzard shad collected were only 4-5 months old and probably had been hatched in Lake Rebecca and spent their entire life there. Thus, it was surprising that they had PCB levels as high as the results show.

2.062 As PCB's are heavier than water, they attach to, and settle out in, bottom sediments. In most situations, it would be unlikely for a fish that feeds on plankton, such as a young-of-the-year gizzard shad, to absorb the amount of PCB's found in the Lake Rebecca fish. However, in Lake Rebecca the carp and buffalofish are continuously stirring up the bottom sediments, which do contain some PCB's. This resuspends the PCB's in the water column where they can be picked up by plankton and transferred to the shad via the food chain. Also, they can be directly picked up from the water by the shad through their gill membranes.

2.063 Spawning habitat is available in the lake for a number of sport species. The marshes on the upper east side of the lake provide good northern pike spawning habitat dependent upon spring water levels. Spawning habitat is present in the lake for largemouth bass, bluegill and black and white crappie.

2.064 The outlet stream is shallow (8 inches) and wide (15'-25') over most of the year. It has a shifting sand and silt bottom. It provides little in the way of habitat, save as an access route for fish from the Mississippi River to Lake Rebecca during high-water periods.

RECREATION

2.065 Site-specific recreation at Lake Rebecca is presently limited to hunting, fishing and "parking." As the area is within the city limits of Hastings, hunting is illegal. However, there appears to be little enforcement of the law as evidence of hunting and hunters themselves have been seen on the site numerous times by Corps personnel.

2.066 Some fishing occurs, primarily for crappies and northern pike. Most fishing is done by children from the banks of the lake.

2.067 Along either side of the lake there is ample evidence to show that the area is used by the young people of Hastings as a place to spend free time with their peers. Litter and campfire remains are common.

2.068 No recreational use surveys have been conducted within the project area. A recreational analysis has indicated that most users of any facilities developed at Lake Rebecca would come from within a 20-road-mile radius of the site. Portions of Dakota, Washington, and Goodhue Counties in Minnesota and of St. Croix and Pierce Counties in Wisconsin are within this zone of influence.

2.069 The majority of the zone of influence is located in region 11 of the Minnesota State Comprehensive Outdoor Recreation Plan (SCORP). The SCORP indicates a deficiency of the type of facilities proposed at Lake Rebecca.

CULTURAL RESOURCES

2.070 In compliance with Section 106 of the National Historic Preservation Act of 1966 and Executive Order 11593, the National Register of Historic Places has been consulted and as of 21 February 1978 the only property listed at Hastings is the Le Duc House, which is not located within the project area. No Natural Landmarks are located in the project area. The Annual Preservation Program prepared by the Minnesota Historical Society has been consulted for cultural resources located in the Hastings vicinity. There are a number of prehistoric, historic, and architectural resources listed, including the Freitag Mounds, the Nininger Mound, the Dakota County Courthouse, the Gardner Hotel, the Gardner Mill, the Ramsey Mill, Guardian Angels Church, the J.F. Norrish House, and the Allen E. Rich House. None of these properties are located in the project area. The National Park Service, the State Historic Preservation Officer, and the State Archaeologist were provided copies of the draft environmental impact statement for review and comment. (See comment/response section.) There are several stone and cement foundations on the island adjacent to Lake Rebecca, where the proposed recreation facilities would be located. The Dakota County Registrar of deeds has records of the island property being owned as far back as 1855. Further record and literature research and field testing will be necessary to determine the age and significance of these remains.

2.071 According to a local historian, there was an Indian camping ground located at the present site of Hastings, and an old Indian trail along the western bluff of Lake Rebecca, both of which are outside of the project area. The island between Lake Rebecca and the Mississippi was very likely utilized by prehistoric and historic Indians for fishing, hunting and/or habitation. An archaeological field survey will be conducted to locate all prehistoric or historic sites, buildings, and structures within the project area.

Prehistoric

2.072 Following the retreat of the glaciers and the revegetation of the landscape, the nomadic big game hunters moved into what is now Minnesota. There is not much evidence remaining to tell us about the lifestyle of these people, often referred to as Paleo-Indians by archaeologists. The information that has been uncovered suggests that they lived in small social groups, following the roaming bison and mammoth. In Minnesota their remains, characterized by distinctively shaped projectile points, have been found in central and southern

Minnesota. The skeleton of one of these early hunters has been found near Brown's Valley, Minnesota. The projectile points that accompanied this burial date to about 6000 B.C.

2.073 Following a climatic change to more moderate temperatures, a number of new food resources became available to prehistoric people. Communities appear to have been less nomadic and subsistence patterns were based on locally available foods. The archaeological record indicates greater cultural diversity resulting from adaptations to different environments. These adaptations to local resources are considered parts of a widespread cultural pattern known as the Archaic Tradition, which dates from about 5000 B.C. to 1000 B.C. It was during this period that the use of copper for fashioning weapons, tools and ornaments originated in the Upper Great Lakes region, and spread eventually to the Red River Valley. A few miles upstream from Hastings in the Spring Lake area of the Mississippi are two sites with Archaic occupations.

2.074 The next tradition, the Woodland, is distinguished from the Archaic by the appearance of pottery and the construction of burial mounds. Elaborate ceremonial rites may have accompanied the burials. The use of copper became less common while bone and antler tools are often found. There are several Woodland sites in the Spring Lake area and on Grey Cloud Island upstream from Hastings.

2.075 About 1000 A.D., the Woodland tradition was replaced in many areas by the Mississippian Tradition which developed and spread along the Mississippi and tributary river valleys. The Mississippian Tradition is distinguished by the intensive cultivation of maize, beans, and squash, which made a sedentary village complex possible. With a stable food supply, the population increased so that these villages may have included 600 to 800 people. There are several known Mississippian villages in the Red Wing area south of Hastings.

Historic

2.076 The explorations of Accault and Father Hennepin into the upper reaches of the Mississippi River in 1680 mark the beginning of the historic period in this part of Minnesota. These two French explorers are recorded to have been taken prisoner by a band of Sioux Indians from the Mille Lacs area and were later rescued by Duluth south of the confluence of the St. Croix and Mississippi Rivers.

2.077 Although only a few French explorers had made their way into this new territory, the native Indian groups were already being confronted with the pressures from Eastern Indian groups moving west, as their lifestyles became disrupted by the fur trade, the military, and European settlement. There are three recorded Sioux Indian villages in the area near the confluence of the Mississippi and Minnesota Rivers. The village located nearest Hastings was at Grey Cloud Island, where Medicine Bottle's band of Dakotas were practicing an agricultural lifestyle. In 1837 the village moved to Pine Bend, where they resided until 1852.

2.078 In 1805 the United States War Department sent Lt. Zebulon Pike on an expedition to explore the Upper Mississippi River for the purpose of obtaining the friendship of the Indians in the area and to select sites for future military forts. Pike is reported to have visited the site of present-day Hastings. In 1819, while bringing supplies to the future Fort Snelling, a detachment of soldiers under the command of Lt. Oliver spent the winter at Hastings. This first settlement was known as Oliver's Grove.

2.079 In 1821, Philander Prescott and Joseph Rolette, Sr., established a trading post on the left bank of the Mississippi River across from present-day Hastings. In 1832, a trading post was built at Oliver's Grove by Joseph R. Brown, one of the central figures in the development of Minnesota. This post, located at what is presently the southwest corner of Second St. and Vermillion, was in operation for only 2 years. The first permanent establishment at Hastings was in 1850 when Alexis Bailley built a trading post on the northeast corner of Second St. and Vermillion. In 1851 the Indians ceded the land to the United States Government, and in 1853 the village of Hastings was platted.

SOCIAL SETTING

Location

2.080 Lake Rebecca lies within the city limits of Hastings, Minnesota. The city of Hastings is located in Dakota County and within the Minneapolis-St. Paul Standard Metropolitan Statistical Area (SMSA). Lake Rebecca parallels the Mississippi River, its northern end separated from Pool 2 of the river by an earthen dike.

Population

2.081 The populations for both Hastings and Dakota County have shown continuous growth since the base year of 1950 (see table 8). Most of this growth is attributable to movement outward from the more crowded housing of the Minneapolis-St. Paul urban area. The availability of space in this area, in contrast to the older, densely populated suburbs, also allows for a greater population increase due to new in-migration from outside the metropolitan area.

2.082 Much of this migration from outside areas to urban fringe areas such as Dakota County may be in response to employment opportunities generated by continuing economic growth in the industrial central urban zone.

Table 8 : Historical and Projected Population Data for Hastings and Dakota County, Minnesota

<u>Year</u>	<u>Hastings</u>		<u>Dakota County</u>	
	<u>No.</u>	<u>% Change</u>	<u>No.</u>	<u>% Change</u>
. 1950	6,560	-	49,019	-
. 1960	8,965	+36.7	78,303	+59.7
. 1970	12,195	+36.0	139,808	+78.5
+ 1976	13,425	+10.1 ¹	184,113	+31.7 ¹
* 1980	13,800	+ 2.8	199,300	+ 8.2
* 1990	17,000	+23.2	273,250	+37.1
* 2000	20,500	+20.6	328,900	+20.4

. U.S. Census Bureau

+ Metropolitan Council, current estimate

* Metropolitan Council forecasts

1 Total % Changes 1970-80

Employment and Industry

2.083 With an estimated 1977 population of about 14,000, the Hastings labor force is approximately 6,697. The labor force is comprised of 2,952 persons in manufacturing enterprises and 3,745 in non-manufacturing activities. According to conservative estimates by the Executive Vice President of the Hastings Chamber of Commerce, retail enterprise in the city has expanded by 30 percent since 1970, 350 new industrial jobs have been created, professional employment has nearly doubled, and government administration has increased by about one-third during this period.

Table 9 : 1970 Census Data of Employment by Industry for the City of Hastings

<u>Industry</u>	<u>Number</u>	<u>Percent</u>
Construction	331	7.2
Manufacturing	1,683	36.8
Transportation, Communication, and Public Services	188	4.1
Wholesale and Retail Trade	781	17.1
Finance, Insurance, Business and Repair	246	5.4
Professional and Related Services	1,000	21.8
Public Administration	141	3.1
Other	206	4.5
Total	4,576	-

2.084 The above table shows employment by census categories for residents of Hastings in 1970. More recent data of comparable detail are not available to provide an exact indication of changes in real numbers employed and categorical proportions. The available data do, however, give a picture of the industrial composition of the employed labor force in the city at the time of the last census.

2.085 Employment data for 1975, as compiled from monthly reports of the Minnesota Department of Employment Services, are given for Dakota County in Table 10. These data are based on State employment services criteria which are based primarily upon potential eligibility for unemployment compensation. Therefore, they are not strictly comparable to the 1970 Census data for the city of Hastings, since they do not present the more inclusive information of yearly total employed in the area.

SECTION TWO

ENVIRONMENTAL SETTING

Table 10 : 1975 Employment for Dakota County⁺

<u>Private Industry</u>	<u>Dakota*</u>	<u>Percentage of Private</u>
Agriculture, Forestry, Fisheries	255	0.6
Mining	101	0.2
Construction	2,907	6.6
Manufacturing	8,787	19.9
Transportation, Communication and Utilities	2,227	5.1
Trade	14,033	31.9
Finance, Insurance and Real Estate	2,345	5.3
Services	5,772	13.1
TOTAL PRIVATE	36,427	82.9
TOTAL GOVERNMENT	7,522	17.1
GRAND TOTAL	43,949	

+ Does not include self-employed

* Average of monthly employment figures

Education

2.086 According to the 1970 census, the educational levels of persons 25 years of age or over in the city of Hastings and Dakota County are as follows:

Table 11 : Educational Attainment, Hastings and Dakota County

<u>Educ. Level</u>	<u>Hastings</u>		<u>Dakota County</u>	
	<u>No.</u>	<u>%</u>	<u>No.</u>	<u>%</u>
8th grade and under	1,585	26.9	12,395	18.7
1 - 3 years high school	860	14.6	8,841	13.3
High school degree	2,160	36.8	26,341	39.7
1 - 3 years college	661	11.3	9,199	13.8
4 or more years college	608	10.4	9,681	14.6
Median years completed	12.2		12.4	

2.087 The level of education shown by these data illustrates a fairly high level of educational attainment for Hastings and Dakota County populations. This indicates a non-rural, industrial occupational structure largely dependent on the adjoining metropolitan area for its employment opportunities.

Government

2.088 The form of municipal government in Hastings is Limited Mayor, with an eight-member Council having general management powers. Elections are by ward on a non-partisan ballot and the mayor is directly elected by popular vote. In 1975, the municipal budget was approximately \$1.5 million, derived primarily from real estate tax revenues. In the same year there were 49 municipal employees.

Community Services

2.089 Community social services available within the city of Hastings include the basic facilities and amenities listed below.

Police Force	15 regular
Fire Department	8 regular, 21 volunteer
Medical:	
Hospital Beds	110
Nursing Home Beds	191
Doctors	10
Dentists	11
Meeting Facilities	3 (Total Capacity 450)
Libraries	1 Public (Total Volumes 30,000+)
Recreation:	
Parks and Playgrounds	16 Municipal
Golf Courses	1 Municipal (18 holes), 1 Private (18 holes)

2.090 In addition to these locally provided services, residents of Hastings also have convenient access to the culture, entertainment, and specialized service resources available within the greater Minneapolis-St. Paul metropolitan area.

Transportation

2.091 The city of Hastings is served by 4 railroads, providing freight-only services at a frequency of 3 trips north and 3 trips south daily. Industrial waterway travel is also provided via the Mississippi River. Hastings is also served by several Minneapolis-St. Paul truck lines. Passenger travel is readily available via a network of Federal, State, and interstate highways. While Hastings has no intra-city bus service, inter-city service is provided by a major busline. Air travel is provided by the Minneapolis-St. Paul International Airport, 17 miles from the city.

SECTION THREE

LAND USE PLANS

3.000 RELATIONSHIP OF THE PROPOSED PROJECT WITH LAND USE PLANS

3.001 The project would be consistent with existing land use plans. The entire project area is zoned recreational (developed). No development has taken place in the area in the past because the degraded condition of Lake Rebecca did not stimulate a demand for facilities.

3.002 The private property side of the lake is zoned residential and it is expected to remain so in the future.

3.003 The project meets the standards and guidelines for projects in the Mississippi River corridor established with the designation of the metropolitan Mississippi River "Critical Area" by the State of Minnesota.

4.000 ENVIRONMENTAL IMPACT OF THE PROPOSED ACTION

SOCIAL EFFECTS

4.001 The Lake Rebecca project would involve no relocations of residences or businesses. However, two forms of land acquisition or zoning would be necessary to the objectives of the project and its long-term operation and maintenance requirements. These are flowage easements and scenic zoning. Flowage easement policy excludes the construction of permanent structures such as boat houses or other attached private recreational facilities. These easements would also relieve the project sponsor from liabilities to private owners in the eventuality of any future inundation in these areas. The purpose of scenic zoning is to preserve the natural integrity of the area by regulating the construction of any structures which would create a visual intrusion upon the project area. Toward this end, scenic zoning would also restrict the removal of natural vegetation cover for the private purposes of the adjacent landowners.

4.002 Some landowners have expressed concern and uncertainty about the possible content and extent of regulations which would be imposed by scenic zoning. It has been explained to concerned landowners that the regulatory content of this form of zoning would be defined by the city government. The text of the proposed ordinance would be made available to landowners prior to its application to particular properties whose regulation would be required by the specific purposes of this project.

4.003 Regulation of recreation use in the project area, by adoption and enforcement of park ordinances, would be the responsibility of the local sponsor. The development and extension of local jurisdiction may alleviate current problems of nuisance behavior in the area, which have been a source of irritation to adjoining landowners and the Lakeside Cemetery Association. Nuisance behaviors in the area have included minibiking, snowmobiling, liquor use, and trespassing, leading to vandalism in adjoining areas. The Lakeside Cemetery Association, in particular, has expressed concern that increased public use of the lake area would increase the vandalism problems. The

Association has suggested that extensive fencing may be necessary to avoid this consequence. However, in the judgment of the local sponsor and the Corps of Engineers, the adoption and enforcement of park ordinances would restrain these behaviors by restricting night access to the area as well as providing police patrol. These measures, and general increased public presence in the area, seem likely to have a greater deterrent effect than would extensive fencing.

4.004 The noise level in the project area should be generally reduced, especially during late hours, when high noise levels cause maximum irritation. One of the major reductions of noise would result from the exclusion of all motorized vehicles (other than automobile access to the parking area). No restriction on such vehicles presently exists. The second source of noise reduction would be the elimination of present late-hours irritation, from both vehicles and beach parties, by closing of the park at 10 pm. The only source of noise which would be created by the project is the swimming beach which, by customary usage, should be confined to daylight hours. This area would be at the opposite side of the lake from residential settlement.

4.005 A minor short-term increase in noise levels would result from the construction of the project. The increase in noise would be confined to day-time hours, and would conclude with the completion of the project.

4.006 The visual aesthetic quality of the area will be enhanced and preserved by the design and maintenance of the project. First, the water surface area of the lake will be increased under conditions of reduced turbidity (due to elimination of the rough fish). Second, the regular collection of litter and refuse, not presently provided, will be assured as a permanent maintenance function. Third, the designation of adjacent private properties as a scenic zone will insure maintenance of the natural integrity of the area. Fourth, the elimination of combustion engine noise will provide an environmental condition necessary to most people for relaxed visual appreciation.

PUBLIC HEALTH

4.007 Lake Rebecca and the adjacent island are producers of mosquitos which can be carriers of diseases such as encephalitis. The opening up of the lower end of the island via vegetation clearing should reduce mosquito populations somewhat by removing breeding sites. However, increased usage of the site by people would expose more individuals to the mosquitos produced on the undisturbed portions of the site.

4.008 The operation of the aeration equipment would result in open water areas in the lake over the winter. These represent a safety hazard and would have to be marked by the local sponsor.

4.009 The Wisconsin DNR has noted in their use of "Helixor" equipment that the ice remains quite thick right up to the open water edge. Thus, there should be no danger from ice weakness away from the holes created by the aerators.

RECREATION

4.010 Recreational usage of Lake Rebecca and the adjacent area would increase significantly. As the size of the recreational resource base is limited, annual use projections are based upon the capacity of the resource.

Estimated recreational capacity of the site is as follows:

Site Capacity (Recreation Activity Occasions Per Year)

<u>Activity</u>	<u>Number</u>
Picnicking	24,000
Swimming	70,700
Fishing	13,800
Boating	11,100
Canoeing	6,900
Hiking	7,000
Nature Interpretation	3,300
Total	136,800

4.011 It is believed that the resource would be used to capacity. Existing usage is estimated to be 1,500 recreation activity occasions, so the net increase would be 135,000 recreation activity occasions provided. The conversion factor for activity occasions to recreation days is division by 1.5. Projected annual use in recreation days is 90,200.

FLOOD STORAGE

4.012 Currently, Lake Rebecca and the island serve a floodwater storage function for the Mississippi River. With the project are proposed, the area would no longer serve this function until floodwaters topped the road to L/D 2. It would take a 17-year flood to do this. The following table shows the amount of Mississippi River flood storage that would be lost up until the 17-year flood.

SECTION FOUR

ENVIRONMENTAL IMPACT

<u>Flood Frequency</u>	<u>Stage</u>	<u>Storage Loss (Approximately)</u>
Average annual flood	684	210 acre-feet
5-year flood	686	245 acre-feet
10-year flood	688	280 acre-feet
15-year flood	690	320 acre-feet
17-year flood	691 (approx.)	335 acre-feet

4.013 While this amount of flood storage loss by itself would have a negligible effect on Mississippi River flood stages, it would add to the cumulative effect of all the Mississippi River floodplain storage losses that have taken place.

TRANSPORTATION

4.014 The project would have a minor adverse impact upon local traffic. It is anticipated that most users of the area would travel down U.S. Highway 61 which is the main north-south route through Hastings. They would turn west on Third Street and proceed via two or three short routes to the road leading to L/D 2.

4.015 The intersection of U.S. Highway 61 and Third Street is regulated by stop signs on Third Street. Heavy traffic to or from the site could lead to congestion problems at this intersection.

CULTURAL RESOURCES

4.016 There are no Nationally Registered properties in the project area. The stone and cement foundations located in the area of the proposed recreation facilities will require additional record and literature research and field testing to determine their age and significance, in addition, there may be other historic and prehistoric sites which have not yet been identified.

4.017 The proposed project also includes raising the level of Lake Rebecca approximately 2.5 feet to an elevation of 680 feet. On the west bank of Lake Rebecca where the shoreline is relatively steep, only a narrow strip of land would be inundated. There is a reported Indian trail along the bluff of the west bank; however, it would be approximately 70 feet above the lake, so it will not be affected by the project. On the east side of the lake, portions of the floodplain and marsh would be inundated. There is some potential for prehistoric and historic remains in this area.

4.018 An intensive field survey would be conducted to locate and test any sites in the areas of impact prior to the start of construction. All sites would be evaluated for eligibility for inclusion on the National Register of Historic Places. Any located sites would either be avoided or mitigated by qualified archaeologists. The construction contractor would be instructed to immediately discontinue work and notify the St. Paul District Archaeologist, should previously undetected sites be encountered during construction. The State Historic Preservation Officer would be notified and the site mitigated if warranted.

ECONOMIC EFFECTS

4.019 The most obvious economic effect would be the investment of public funds on a project that generates benefits in the form of recreational experiences rather than in direct monetary return.

4.020 Some stimulus to local business may occur during the construction phase from the influx of dollars. At this point this is difficult to quantify as some of the local sponsor's cost share may take the form of donated time and labor.

4.021 Once the project is in operation, the city of Hastings may hire personnel to perform operation and maintenance jobs or they may elect to place the responsibility upon the existing city work force. This is a local decision and can only be speculated upon at this time.

NATURAL RESOURCES EFFECTS

4.022 Groundwater - The excavation associated with the bottom shaping at the lower end of the lake may cut into the local aquifer discharging to the river at this point. If this were to happen, an additional source of fresh water in the form of springs would be provided to the lake. This would be beneficial by increasing the flushing rate of the lake and possibly by maintaining ice-free areas in the winter, which would aid in reaerating the lake.

4.023 Terrestrial Habitat and Biota - There would be a loss of approximately 27 acres of terrestrial type habitat to the recreational development and the enlarging of the lake. This is not anticipated to reduce the diversity of terrestrial species using the area, but would reduce total population levels.

4.024 The increased human activity in the area may eventually lead some of the shy forest bird species to no longer use the areas adjacent to the recreation area. The human activity is not expected to significantly affect mammal species present, as most of those species observed on the site are somewhat tolerant of human activity.

4.025 Water Quality/Aquatic Habitat and Biota - As water quality and aquatic biota are interrelated, these parameters will be addressed together.

4.026 During construction, most of the impact would take place in the area of the outlet stream, as this area would be excavated and shaped to provide deeper water once the lake is raised to 680.0. Portions of the outlet stream as it now exists would disappear and become part of Lake Rebecca. The remainder of the stream would only have water in it following precipitation events at Hastings with subsequent storm sewer discharges. For all practical purposes it would cease to exist as a stream.

4.027 During construction, the area currently occupied by the outlet stream would have to be dewatered. The most likely method would be to pump Lake Rebecca down so it does not outlet through this area and then continue pumping to keep the lake down. This water would be discharged to the Mississippi River. The effects upon the river should be negligible as this is water that would naturally discharge to the river.

4.028 The storm sewer would continue to discharge to the river via the outlet stream. Some retention time of the storm sewer effluent would be lost for those periods in the spring when Lake Rebecca is normally flooded by the Mississippi River and the storm sewer discharges into a backwater lake environment. The net effect upon the Mississippi River would be negligible.

4.029 The largest physical change to Lake Rebecca would be an increase in size and depth. Approximately 31 acres would be flooded. Nine acres would be gained in the area currently occupied by the outlet stream. Water depths should be sufficient in this area to consider the additional acreage as a gain in lake area. The area flooded on the upper end of the lake (22 acres) would be shallow and more wetland in nature. Thus, the impact of flooding this area is addressed in the section on wetlands. The main body of the lake would increase in average depth from 5.75 to 8.25 and in maximum depth from 10 to 12.5 feet.

4.030 The nutrient levels in the lake are not expected to be significantly changed. The control of Mississippi River floodwaters and diversion of the storm sewer should keep nutrient levels from increasing in the lake since the nutrient input to the lake from watershed runoff is probably minimal.

4.031 The slow flushing of the lake by springwater may reduce nutrient levels somewhat. However, this effect would probably be negated by the return of vascular aquatic plants to the lake, as these plants tend to "pump" nutrients out of sediments back into the aquatic medium.

4.032 The eradication of the rough fish in the lake would reduce the turbidity in the lake. This in turn will increase light penetration and algae growth. The extent of the growth and its potential for creating problems depend somewhat upon competition from vascular plants for nutrients (see paragraph 4.038).

4.033 At the present time, Rotenone ($C_{23}H_{22}O_6$) and Antimycin are the only fish toxicants registered for use in the United States. The Minnesota DNR has indicated they would use Rotenone to eradicate the existing fishery. Total eradication is possible as the lake can be pumped down somewhat to concentrate the fish and deny them any route of escape. The fish killed would be collected and disposed of in a sanitary landfill.

4.034 The Rotenone would break down in approximately one week. There would be no danger of the toxicant reaching the Mississippi River as the lake would be refilling during this period and not discharging. Even if the Rotenone did reach the river, the dilutional effect of the river would reduce the concentration of the toxicant to harmless levels.

4.035 Rotenone is slightly toxic to birds and moderately toxic to mammals. Oral LD 50's* for mallards and pheasants are in excess of 1000 mg/kg for dogs and 2,850/kg for man. Levels in the lake would probably be on the order of .5 mg/l, which is far below the LD 50's noted above.

4.036 Some other aquatic life in the lake such as zooplankton would also be affected by the Rotenone. Zooplankton would quickly recolonize the lake. There probably would be a temporary population explosion of these organisms as there initially would not be a sufficient predator population (fish) to control their population levels.

4.037 Following eradication, the lake would be restocked by the DNR. The DNR anticipates stocking with largemouth bass and walleye in the fall immediately following the eradication project. The following spring, northern pike and bluegills would be stocked.

*LD 50 is the amount of rotenone necessary to kill 50 percent of a sample population in a given test period, usually 96 hours.

4.038 With the eradication of the rough fish, the water in the lake would clear up and vascular aquatic plant growth would return. As the lake is shallow, warm, and eutrophic, it is expected that after a few years all areas shallower than 8 feet would have profuse aquatic plant growth. Attempts to quantify the severity of the aquatic plant problem can only be speculative, as much depends upon natural water clarity, plant species and competition for nutrients from planktonic algae.

4.039 Curly-leaf pondweed (Potamogeton crispus) is expected to be the pioneer species, with other pondweeds (Potamogeton sp.), coontail (Ceratophyllum demersum), yellow water lily (Nuphar variegatum), and white water lily (Nymphaea tuberosa) eventually coming in.

4.040 Once conditions in the lake are stabilized, it is expected to support a northern pike-largemouth bass-bluegill fishery. Management of the fishery would be the responsibility of the Minnesota DNR.

4.041 It is expected that rough fish would eventually reenter the lake via floods, birds, fishermen, etc. If they reached problem levels, the DNR would probably undertake another eradication/restocking effort to restore the sport fishery.

4.042 Any PCB's present in the lake water should become tied up with the lake sediments. It has been shown that bottom-dwelling fish such as bullheads and carp tend to accumulate PCB's in their flesh. It is not known whether the method of transport is via the food chain or direct assimilation. PCB's are not expected to present a problem in Lake Rebecca as the levels found in the lake sediments are relatively low.

4.043 Currently there are no plans to relocate or protect the pipeline running along the base of the L/D 2 dike. The pipeline will continue to pose a threat to the lake in that area along the north end of the lake. The chances of recurrent pipeline break are minimal, but if it were to occur, especially in the open water season, the degradation of Lake Rebecca could be significant. Much would depend upon the magnitude of the spill and the ability of the Koch Refining Company and State and Federal agencies to respond to the emergency.

4.044 Air Quality - The primary source of air quality impact would be from heavy equipment exhaust emissions and dust created by earth moving operations during the construction phase. If dust becomes a problem during construction, problem areas would be watered to suppress dust emissions.

4.045 Wetland - The flooding of 22 acres at the upper half of the lake would convert 13 acres of floodplain forest (Type I wetland) to Type II-III wetlands and would convert 9 acres of Type II-III backwater sloughs to Type III-IV wetlands.

4.046 The water depths in the flooded timber areas would range from a few inches to 18 inches. The final decision on the fate of the flooded timber would not be made until the extent of the die-off is clearly known. The area should provide increased habitat for waterfowl. With vascular aquatic plant growth returning to the lake, the area would become much more attractive for waterfowl, especially during the fall migration.

4.047 The use of the lake by beaver would be reduced primarily through the loss of the outlet stream and increased human activity. Muskrat usage would increase if the flooded timber is removed and portions of that area revegetate with sedges and cattails.

4.048. The proposed activities affecting wetlands were evaluated with respect to Executive Order 11990, the Chief of Engineers wetland policy (33 CFR 209.145 (e)(3)), and Environmental Protection Agency guidance (40 CFR 230) as applicable.

4.049 An evaluation per the requirements of Section 404(b) of Public Law 92-500 is contained in exhibit 2. Findings as required by Section 2(a) of E.O. 11990 are contained in exhibit 2A.

5.000 UNAVOIDABLE ADVERSE IMPACTS OF THE PROPOSED ACTION

5.001 There would be construction disturbances that can be minimized but not entirely avoided such as noise, dust, soil movement, and vegetation clearing.

5.002 The safety hazard of open water in the winter cannot be avoided. Efforts must be made to make the public aware of the hazard.

5.003 There would be an increase in traffic, particularly along the streets leading to the access road. Congestion at one controlled intersection may become a problem.

5.004 There would be a reduction in terrestrial habitat in the project area from flooding and conversion of wooded area to a developed recreational area.

5.005 A number of trees would have to be removed along the western shoreline of the lake as they would be inundated by the lake raise.

5.006 The existing fishery of Lake Rebecca would be eradicated.

5.007 Returning vascular plant growth to the lake may reach nuisance levels requiring cosmetic maintenance measures to keep high-use areas free of plants.

6.000 ALTERNATIVES TO THE PROPOSED ACTION

NO ACTION

6.001 The no action alternative would be no project at Lake Rebecca, i.e., maintenance of the existing situation. Under this alternative Lake Rebecca would remain a winterkill lake dominated by rough fish populations. Recreational usage of the lake would probably remain at about the present level.

6.002 The island would also remain relatively unchanged. The flood-plain forest is a climax ecotype perpetuated by periodic flooding. Over time, the species composition would remain the same, the density of individual species fluctuating with the periodicity of flooding. A period of years with high spring floods would tend to favor cottonwood and black willow growth, while a period of little spring flooding would favor silver maple and American elm.

6.003 It is unlikely that local interests could do any work in the area without some Corps involvement as the Corps owns the property on the eastern shore of the lake and has regulatory authority encompassing the lake under Section 10 of the Rivers and Harbor Act of 1899 and Section 404 of the Federal Water Pollution Control Act Amendments of 1972.

ALTERNATIVES TO NECESSARY TASKS

6.004 Earlier in this document (paragraphs 1.007-1.009), it was stated that there were a number of tasks necessary to achieve the project goals. During the planning process a number of methods were considered to accomplish these tasks. The following is a synopsis of the alternatives considered and why some were discarded, others selected. To reiterate the five necessary tasks, they are:

- a. Alleviation of chronic winterkill problem
- b. Control of rough fish
- c. Provision of recreational facilities
- d. Diversion of the storm sewer
- e. Relocation of the power line

Winterkill Alleviation

6.005 Three potential methods of alleviating Lake Rebecca's winterkill problem were identified: (1) substantially increase the volume of the lake to increase its capacity for storing dissolved oxygen, (2) intro-

duction of Mississippi River waters at the upper end of the lake over the winter to provide flow-through water, and (3) mechanical aeration.

6.006 Increasing the volume of the lake could be done by raising the lake and dredging. The lake can only be raised 2.5 feet without extensive flooding of the island, so this alone would not be the solution.

6.007 Dredging coupled with a lake raise could substantially increase the volume of the lake, as shown in the table below.

Table 12.

	Volume ¹ (acre-feet)	Ave Depth ¹ (feet)	Max Depth ² (feet)
Existing Condition (elevation 677.5)	213	5.75	9.5
Lake Raise to Elevation 680.0	305	8.25	12.0
Lake Raise and Dredging			
50,000 cy	336	9.10	13.7
100,000 cy	367	9.95	15.3
200,000 cy	429	11.60	18.7
300,000 cy ³	491	13.30	22.0

¹ Volume and ave depth figured for present lake area only

² Max depth over about $\frac{1}{2}$ of the lake area

³ Maximum volume that could be practicably dredged because of long narrow shape of the lake.

6.008 Minnesota DNR fisheries personnel do not believe that even the maximum increase in lake volume would alleviate the winterkill problem. This, coupled with other problems with dredging as outlined in paragraphs 6.030-6.037 pages 53-54, eliminated the dredging alternative from consideration.

6.009 Water could be allowed through the dike via culverts from Pool 2 of the Mississippi to add oxygenated water into the lake in the winter. This plan was removed from consideration as it would be nearly impossible to effectively control rough fish entry into the lake from Pool 2 and would allow lower-quality water (nutrients, sediment loading, etc.) into the lake.

6.010 The process of elimination left mechanical aeration as the most viable solution. The "Helixor" system was selected as it has been shown to be effective on other winterkill lakes in Wisconsin and Minnesota.

Control of Rough Fish

6.011 Control of rough fish entry into the lake is fairly straightforward, as the only source of direct access (other than stocking by man or birds) is from the Mississippi River. Thus the control structure was placed at the access point; i.e., the culvert where the lake outlets.

6.012 Eradication of the rough fish in the lake is also necessary. Two potential methods were considered: draining the lake, and eradication with a toxicant. The lake will not drain as the bottom of the lake is well below the elevation of the outlet. Pumping would lower the lake but not completely empty it. Pumping could not keep ahead of groundwater and seepage input once the lake was near empty, primarily because of the reversal of hydraulic head with the Mississippi River below L/D 2 once the lake dropped below 675.0 and the ever-increasing hydraulic head differential with Pool 2. Thus, use of toxicant is deemed to be the only viable alternative.

Provision of Recreational Facilities

6.013 It is the position of the St. Paul District that any restoration of the fishery in Lake Rebecca must be accompanied by some recreational development to provide the public better access to and ability to use the lake. Without this, the primary benefactors of any fishery restoration efforts would be the private landowners on the west side of the lake and not the general public.

6.014 The basic tenet during the planning of the recreational facilities was to provide the public the ability to enjoy Lake Rebecca with the minimal amount of disturbance to the natural setting of the area.

6.015 The area has the capacity for additional facilities such as softball fields, snowmobile trails, trailer-in boat launches, etc.

6.016 These types of facilities were eliminated during the planning phase on the basis that associated with them would be environmental disturbances and alterations not consistent with the basic planning tenet.

Storm Sewer Diversion

6.017 An alternative method of diverting the storm sewer from Lake Rebecca would be to continue it on in an 84-inch concrete pipe directly to the Mississippi River. This was the plan proposed in the draft EIS. It is advantageous over the proposed plan in that it would eliminate the need for the dike and allow Lake Rebecca to be about 5 acres larger at elevation 680.0. It also would provide for more positive rough fish control by eliminating the area between the dike and the road from which people could transfer rough fish into Lake Rebecca.

6.018 During subsurface investigations it was discovered that due to substrate conditions along the base of the bluff where the 84-inch concrete sewer extension was proposed to go, the costs of this alternative would be much greater than originally believed (about \$840,000). For this reason, the more economical dike alternative (\$670,000) was chosen even though it is not as desirable as diverting the storm sewer with a buried concrete pipe.

Power Line Relocation

6.019 The relocated power line could obviously take different routes. The selected route is the most economical in that it ties into the existing line on the bluff side of the lake and runs along the road and the tank farm to minimize clearing expense.

ADDITIONAL ALTERNATIVE FEATURES

6.020 The following is a discussion of additional alternatives to certain aspects of the proposed action. Selection of these alternatives would not significantly affect the achievement of project goals.

Lake Raise

6.021 Some raise in lake levels is considered necessary to provide the vertical drop in the outlet structure to control rough fish. The proposed project raises the lake to 680.0, which provides 5 feet of vertical drop to control rough fish. A raise over 680.0 is not considered viable as extensive flooding of the island would occur.

6.022 A lesser lake raise to only 679.0 is a viable alternative. This alternative would give four feet of vertical drop in the control structure. This also would be sufficient to control rough fish. However, the safety margin against a sudden one- or two-foot fluctuation in the Mississippi River would be reduced.

6.023 With a lake raise to 679.0, approximately 11.5 acres (4 acres of forest and 7.5 acres of marshes) would be flooded on the upper end of the lake, as opposed to 22 acres (13 forest and 9 marsh) for the proposed raise. Due to the proposed bottom shaping, 9 acres would still become lake on the lower end.

6.024 Average lake depth would be less than with the proposed plan, which could add to any vascular aquatic plant growth problems that may occur in the lake.

6.025 The proposed raise to 680.0 opts for the added safety factor in rough fish control and added lake depth versus the flooding of less forested acreage with a raise to 679.0.

Vegetation Clearing

6.026 The proposed plan would leave the vegetation to be flooded at the upper east end for a period of 2-3 years. At that time the decision would be made as to how many, if any, of the trees that would die off are to be removed.

6.027 The alternative exists of clearing this area before flooding. An advantage is that there would not be a large number of dead trees present in a few years which some people would find aesthetically displeasing.

6.028 The disadvantage of this alternative is that predicting which trees would die in this relatively flat area would be difficult. Thus, some trees above 680.0 that would not die may be removed and some that would die may be missed. In a few years there should be a clear distinction between the trees that would die and those that would not.

6.029 Another disadvantage of clearing now is that it would preclude the possibility of allowing some flooded trees to remain as wildlife habitat.

Dredging

6.030 For some time, dredging was considered a possible alternative for the prevention of winterkill, so it received detailed investigation. It was discovered to be economically unviable, environmentally controversial, and was considered nonpreventive of winterkill by the Minnesota DNR. At the present it is considered a non-viable alternative. However, a discussion is provided here as background information.

6.031 Dredging was initially considered a solution to both winterkill and potential vascular aquatic plant growth problems. It still is considered a solution to the latter.

6.032 The major problem with dredging in Lake Rebecca lies with disposal of the material. Trucking the material away could only take place after dewatering of the silty-clay sediments. This would require a diked-disposal area on the island for dewatering, which would take 2-3 years. Also, the material was found to be non-suitable to construction, so none of it could be used as fill in the area to be recreationally developed.

6.033 Next, open-water disposal was considered. As the lake sediments are polluted, they would have to be diked. Diking areas in the upper end of the lake were considered. The diked area could be filled to about 679.5. When the lake was raised to 680.0, these areas would become wetland in nature. The planting of wetland species would speed up the process.

6.034 The major problem with this solution is the loss of lake area, which is inconsistent with the project purpose of rehabilitating the lake. Another problem is a lack of capacity. Dredging and disposing of 40,000 cubic yards (cy) via this method would fill about one-fourth of the lake.

6.035 Next, disposal in Pool 2 of the Mississippi River was considered. Dredging 200,000 cy from the lake would require a 25-acre diked disposal area in Pool 2. As with in-lake disposal, a wetland would be created on the disposal area with the above-water portions of the dikes removed once the wetland vegetation became thoroughly established on the disposal area.

6.036 This alternative involved substantial environmental trade-offs, the primary disadvantages being the loss of 25 acres of open water in Pool 2 and the environmental disturbance of a dredging and disposal operation versus the gain of 25 acres of wetlands and improved habitat in Lake Rebecca.

6.037 This alternative was found to be economically unviable. In addition, the Minnesota Pollution Control Agency stated they would oppose any open-water disposition proposal. This alternative would have undoubtedly raised substantial controversy if it had become the proposed plan.

Fencing

6.038 The private property owners on the west side of the lake have expressed concern that there may be an increase in trespassing and vandalism on their property. It would be possible to protect this property with a fence. To protect the entire length of the west bank of the lake along the private property would require approximately 7,200 linear feet of fence. The cost would vary significantly with the type and height of fence to be used, as listed below.

<u>Type</u>	<u>Height</u>	<u>Cost</u>
Chain link	6 feet	\$60,500
	4 feet	46,800
Woven wire with 4 x 4 posts	6 feet	14,400
	4 feet	12,600

Some clearing of vegetation would be necessary. Another question is the appropriateness of a fence on some of the very steep slopes which occur on this side of the lake.

6.039 At this time, it is the opinion of the Corps of Engineers that signing the private property and adopting and enforcing park ordinances would deter nuisance behaviors. The signs would be in keeping with the surroundings, easily read, strategically placed to be visible, and would contain a message that the property is private and no public access or use is permitted. Park ordinances would restrict night access and use as well as providing police patrol.

7.000 THE RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF THE ENVIRONMENT AND THE MAINTENANCE OF LONG-TERM PRODUCTIVITY

7.001 The project would utilize about 10 acres of land for recreational purposes for the project life of fifty years. The biological productivity of the area would be reduced as some areas would become roads, parking lots, etc., and others would be maintained with an open-park type vegetative cover. The soils of the area would not substantially change and in time the area could restore itself with the removal of the man-made facilities.

7.002 The biological productivity of the lake should increase as increased light penetration would increase primary productivity. The food chain in the lake would become longer and more complex. There would be a loss in total mass converted to a form usable by man (fish flesh) as the lake would not support the poundage of sport fish that is now present in the lake in the form of rough fish. However, there would be an increase in the amount of fish flesh used by man because of the social preference for sport fish over rough fish.

8.000 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES WHICH WOULD BE INVOLVED IN THE PROPOSED ACTION SHOULD IT BE IMPLEMENTED

8.001 A stretch of stream approximately 1200 feet long would be excavated and converted to lake, or have flows cut off such that it would cease to exist as a permanent stream.

8.002 Hydrocarbon fuels, natural materials and human labor would be expended in the construction of the project.

8.003 Electricity, hydrocarbon fuels, and human labor would be expended in the operation of the project features.

8.004 Approximately 13 acres of floodplain forest would be altered or eliminated by the project.

9.000 COORDINATION

9.001 The Corps has worked closely with the city of Hastings (the local sponsors) and the Lake Rebecca Task Force during the formulation of the proposed project.

9.002 On 10 September 1976 a meeting was held in Hastings with the public and interested agencies to provide background information and updated information on the data collection process.

9.003 On 6 October 1976 an interagency coordination meeting was held at the St. Paul District Office to solicit the views of, and discuss the project with, the Federal and State agencies most directly involved with the project (either as participants or in a review capacity). Agencies represented at this meeting included the U.S. Environmental Protection Agency, the U.S. Fish and Wildlife Service, the Minnesota Pollution Control Agency, the Minnesota Department of Natural Resources, and the Corps of Engineers.

9.004 On 9 December 1976 and 5 May 1977 public information meetings were held in Hastings to inform the public and interested agencies on the progress in developing a plan.

9.005 A public hearing was held on 23 August 1977 in Hastings to solicit public input on the proposed project.

9.006 The following agencies, interest groups and individuals were furnished copies of the draft environmental impact statement for review and comment.

U.S. Environmental Protection Agency
U.S. Department of the Agriculture, Forest Service
U.S. Department of the Agriculture, State Conservationist
U.S. Department of Commerce
U.S. Department of Health, Education and Welfare
U.S. Department of Housing and Urban Development
U.S. Department of the Interior
U.S. Department of Transportation
Advisory Council on Historic Preservation

Minnesota State Planning Agency
Minnesota Energy Agency
Minnesota Department of Agriculture
Minnesota Department of Economic Development
Minnesota Department of Health
Minnesota Department of Transportation
Minnesota Department of Natural Resources
Minnesota State Park Commission
Minnesota Pollution Control Agency
Minnesota Historical Society
Minnesota Water Resources Board
Minnesota State Archaeologist
Environmental Quality Council
Minnesota Senate, Natural Resources and Agriculture Committee
Legislative Commission on Minnesota Resources
Minnesota House of Representatives
Minnesota-Wisconsin Boundary Area Commission

Prof. H. Paul Friesema
Mr. Thomas C. Reuter
Mr. Morrill Jarchow
Mr. N.J. Dreis
Mr. & Mrs. Vernon Jenson
Mr. Roger K. Johnson
Mr. Tom Metzger
Mr. Henry Werth
Mr. Dennis Pellant
Mr. Robert L. Dodge
Mr. Werner Fasbender
Mr. Gary Seibert
Mr. Brian Sweeney
Mr. John McKane
Mr. Ken Lav
Mr. Gilbert B. Gergen
Mr. Robert Schmitz

Mr. Floyd Wilson (Lake Side Cemetery Association)
Ms. Faith E. Crook
Mr. Donald L. Taplin
Mr. Jim Schneider
Ms. Nancy Livingston (St. Paul Dispatch)
Mrs. Floyd Wilson
Mr. Louis L. Flynn
Mr. Tony Willeke
KDWA Radio
Mr. Jerome Sivar

Lake Rebecca Task Force
Mr. Mike O'Connor, Mississippi Valley Star
Mr. Jim Cosby, Hastings City Administrator

Hon. Wendell Anderson, U.S. Senate
Hon. Hubert H. Humphrey, U.S. Senate
Hon. Albert H. Quie, U.S. House of Representatives
Hon. Harry Sieben, Minnesota House of Representatives
Hon. Walter E. Petersen, Mayor of Hastings

Mr. Roscoe Collingsworth, Midwest Research Institute
Ms. Rita Olson
Lee Erickson
Mr. Dexter J. Marston
Metropolitan Council
Hastings Chamber of Commerce
Hastings Kiwanis Club
Hastings Natural Resources Commission

9.008 Copies of the draft EIS were also sent to the following libraries, where they were available for public review.

Minneapolis Public Library
Minnesota Legislative Library
Hastings Public Library
St. Paul Public Library
Hill Reference Library (St. Paul)
Metropolitan Council Library (St. Paul)

9.009 All written comments received on the draft EIS, along with the Corps responses, appear on the following pages.

LETTERS of COMMENT
and
CORPS RESPONSES



UNITED STATES
ENVIRONMENTAL PROTECTION AGENCY
REGION V
220 SOUTH DEARBORN ST.
CHICAGO, ILLINOIS 60604

CORPS RESPONSES TO THE U.S.
ENVIRONMENTAL PROTECTION AGENCY

SEP 25 1977

Major Walter L. Neme
Acting District Engineer
U.S. Army Engineer District, St. Paul
1135 U. S. Post Office & Custom House
St. Paul, Minnesota 55101

RE: 77-055-194
D-COE-F39004-KN

Dear Major Neme:

We have completed our review of the Draft Environmental Impact Statement (EIS) on the proposed project for Lake Rebecca, Upper Mississippi River at Hastings, Minnesota. Your letter of July 25, 1977, requested our review and comments on the proposed project. Based upon our review of the Draft EIS, we have no major objections to the project's implementation. We request the following comments be addressed in the Final EIS.

1 Scenic zoning and flowage easements to protect the natural aesthetics and biological integrity of the area should be considered an important element of the proposed project. Additional information on anticipated secondary developments around the lake should be provided. The Final EIS should address how the State of Minnesota's "Environmental Quality Councils Designation of the Mississippi River as a Critical Area."

2 As the project is proposed, the storm sewer discharge into Lake Rebecca will be rerouted to discharge directly into the Mississippi River. This discharge could cause adverse water quality impacts in the Mississippi River. In order to minimize potential adverse impacts, the Village of Hastings should clean the streets drained by the storm sewer more frequently. Additionally, the catch basins should be cleaned more often and the storm sewer should be inspected to determine whether or not any sanitary sewers are connected illegally.

3 At the present time Lake Rebecca serves as a backwater treatment area for the Mississippi River water and storm water discharges. This mechanism for the renovation and treatment of storm water and Mississippi River water is a combination of physical entrapment and adsorption, microbial transformation, and biological utilization. This mechanism will be lost with the exclusion of the lake from the Mississippi River system. This in turn, will have an effect upon the water quality of the Mississippi River.

1. We concur. Scenic zoning and flowage easements are part of the proposal. (See paragraphs 1.054 to 1.056, pages 12-13.)
2. As one side of the lake is public property and the other side is residential, controlled by city zoning, no secondary developments around the lake are expected to occur.
3. A discussion addressing this point has been added to the final EIS. (See paragraph 3.003, page 40.)
4. Under the plan as now proposed, the storm sewer would continue to discharge to the Mississippi River via the outlet stream. We agree that management practices by the city in the storm sewer's watershed would reduce impacts to the river. However, this is not within the scope of the proposed project.
5. We concur. A discussion addressing this has been added to the final EIS. (See paragraph 4.028, page 46.)

CORPS RESPONSES TO THE U.S.
ENVIRONMENTAL PROTECTION AGENCY

The proposed plan calls for the restocking of Lake Rebecca with several sport fish including the channel cat fish. It has been found that the cat fish stores greater amounts of PCB's in their fatty tissue. Since PCB's have been found in the lake, we recommend the channel cat fish not be stocked at this time.

Plans for the control of oil spills from the adjacent tank farm should be outlined. Methods to prevent the oil from entering Lake Rebecca should also be detailed.

Based upon our review of the Draft EIS, we have rated the project as LD (lack of objection) and have classified the EIS as Category 2 (additional information necessary). The date and classification of our comments will be published in the Federal Register in accordance with our responsibility to inform the public of our views on other agencies' projects.

We appreciate the opportunity to review the Draft EIS. When the Final is filed with the Council on Environmental Quality, please forward two copies to us. If you have any questions in regard to our comments contact Mr. William D. Franz 312-353-2307.

Sincerely yours,

Donald L. Mustard

Donald L. Mustard
Acting Chief
Environmental Review Section

6. The Minnesota DNR has responsibility for stocking and managing the fishery of Lake Rebecca. They have not made any definite stocking plans for channel catfish but are merely considering that as one possibility. At this stage it is difficult to predict whether the small amounts of PCB's in the lake sediments will be permanently tied up in the sediments, or will be accessible to the aquatic food chain. Our opinion right now is that the levels of PCB's in the lake sediments are such that a problem of bioaccumulation in catfish is not a serious threat.
7. Spills from the tank farm should pose no problem as the entire tank farm is surrounded by a containment dike. See paragraph 4.043, page 48, for a discussion concerning the oil pipeline.

UNITED STATES DEPARTMENT OF AGRICULTURE
FOREST SERVICE
NORTHEASTERN AREA, STATE AND PRIVATE FORESTRY
6816 MARKET STREET, UPPER MERION, PA. 19082
(215) 596-1671

8430
September 15, 1977



CORPS RESPONSES TO THE U.S. DEPARTMENT
OF AGRICULTURE - FOREST SERVICE

- a. Your suggestion will be taken into consideration during the design stage of the project when final shore protection measures and planting schemes are developed.

Walter L. Heme
Major, Corps of Engineers
Department of the Army
St. Paul District
Corps of Engineers
1135 U.S. Post Office & Custom House
St. Paul, Minnesota 55101

Refer to: MCSHD-ER, Draft
Environmental Statement, Lake
Rebecca Project, Hastings, MN

Dear Major Heme:

We feel that our concerns in forested land have been represented thoroughly by coordination with natural resource agencies during the planning process.

- c. At the edge of the lake at some places where there are no artificial structures, the planting of small trees such as willow or alder could be considered for erosion control.

Thank you for the opportunity to review this statement.

Sincerely,

William Lantz

W. DALE O. VANDENBURG
Staff Director
Environmental Quality Evaluation



United States Department of the Interior

OFFICE OF THE SECRETARY
NORTH CENTRAL REGION
2510 DAMPETER STREET
DES PLAINES, ILLINOIS 60016

EA 77/714

September 12, 1977

Colonel Forrest T. Gay, District Engineer
U.S. Army Corps of Engineers
1135 U.S. Post Office and Custom House
St. Paul, Minnesota 55101

Dear Colonel Gay:

In response to your July 25, 1977 letter, the Department of the Interior has reviewed the draft plan for development and environmental impact statement for Lake Rebecca, Hastings, Minnesota, and found them to be adequate with the following exceptions.

The development plan (page 15) describes an oil pipeline near the lake shore, but does not indicate what effect the project will have on the pipeline. We suggest that protection or relocation of the pipeline be discussed.

Tables 4 and 5 of the plan of development and the table on page 42 of the draft environmental impact statement have incorrect figures which should be changed.

Figure 3 of the draft plan and Figure 5 of the draft environmental impact statement show the extent of the aquiclude above the deeper alluvial aquifer. Since these figures suggest full confinement of the aquifer, the statement or plan should indicate whether the aquifer is still under artesian pressure. The potential for cutting into the aquifer during project construction should also be discussed.

In paragraph 2.073 on page 28 of the environmental statement, region 2 should be changed to region 11.

We are pleased to note that a cultural resource survey is planned for the project area. Correspondence from the State Historic Preservation Officer, along with other pertinent documentation, should be included in the final statement; and effects on cultural resources should be evaluated in accordance with the Advisory Council on Historic Preservation "Procedures for the Protection of Historic and Cultural Properties" (36 CFR 800).

Sincerely,

David L. Jervis
David L. Jervis
Regional Environmental Officer

COPE'S RESPONSES TO THE U.S. DEPARTMENT OF THE INTERIOR

9. A discussion of the pipeline has been added to the final EIS. (See paragraph 4.043, page 48.)
10. The referenced tables have been updated and corrected.
11. A discussion on this subject has been added to the final EIS. (See paragraph 2.014, page 21 and paragraph 4.022, page 45)
12. The referenced statement has been corrected.
13. Pertinent correspondence is included in the comment/response section. The survey has not yet been conducted. The results of the survey will be provided to the State Historic Preservation Officer (SHPO), the State Archaeologist, and the Office of Archaeology and Historic Preservation (OAH) for their review. Coordination will be initiated with the SHPO, OAH, and the Advisory Council on Historic Preservation concerning any resources determined eligible for the National Register of Historic Places that will be impacted by the project.



STATE OF MINNESOTA
DEPARTMENT OF NATURAL RESOURCES
CENTENNIAL OFFICE BUILDING - ST. PAUL, MINNESOTA - 55155

September 20, 1977
DNR INFORMATION
(612) 296-6157

Colonel Forrest T. Gay III
District Engineer
St. Paul District Corps of Engineers
1135 U.S. Post Office and Custom House
St. Paul, Minnesota 55101

Re: MCSHD-ER DEIS and Draft Plan
for Development for Lake
Bebecca, Upper Mississippi
River at Hastings, Minnesota

Dear Colonel Gay:

Our agency has reviewed the above referenced documents and offers the following comments.

The proposed dredging of materials to deepen certain areas of the lake and the associated spoil placement within the floodplain will cause temporary erosion problems. Therefore the City of Hastings, will be required to obtain a permit from DNR which will include appropriate erosion control measures during construction.

According to statement 4.033 on page 46 of the DEIS, "most other aquatic life in the lake such as invertebrates and amphibians would also be eradicated by the Rotenone". This statement is not true, since the concentration used, will not kill aquatic life, including turtles, amphibians, snails, clams, crayfish, aquatic vegetation, etc. The zoo plankton population may be temporarily depressed but will rebound to higher levels, than found at the time of treatment, within eight months following treatment.

A canoe launch is proposed on page 41 of the draft plan for development, but no boat launch ramp is recommended. In addition, it is proposed to allow electric motors but to ban gasoline powered boats on Lake Bebecca. A small boat launch should be developed next to the canoe launch to handle small fishing boats which will be the only type boat using the lake since only electric motors are allowed. We will need a boat launch site to carry out Fisheries surveys and test netting operations. A launch site may also be necessary for enforcement of boat and water safety laws.

According to state law we cannot stock fish in any water to which the public is denied free access and use. Although all parties are aware of this law from previous meetings, it is not stated in the

CORPS RESPONSES TO THE MINNESOTA
DEPARTMENT OF NATURAL RESOURCES

14. The referenced paragraph has been modified to reflect this. (See paragraph 4.036, page 47, of the final EIS.)
15. A boat launch ramp has been added to the proposed plan. (See paragraph 1.046, page 11, of the final EIS.)
16. A statement to this effect has been added to the final EIS. (See paragraph 1.046, page 11.)

14

15

16

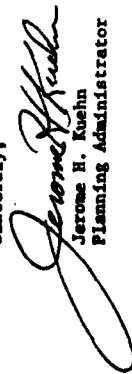
Colonel Forrest T. Gay
September 20, 1977
page 2

report, or at least we could not find an assurance that no fee would be charged for launching boats or canoes.

Some loss of wildlife habitat will occur in conjunction with the construction of picnic grounds and swimming beach, but the overall benefits gained will negate any losses. The greatest problem for wildlife will be the disturbance created by the anticipated large number of people using the area upon completion. However the disturbance area will be centralized.

Concluding, we have no serious objections to the project as presented in the documents.

Sincerely,


Jerome H. Kuehn
Planning Administrator

JMK:as:dh

cc: Larry Seymour
Oliver Jarvenpa
Milt Krona
Al Wald



DEPARTMENT OF TRANSPORTATION
UNITED STATES COAST GUARD

U.S. COAST GUARD
COMMUNICATIONS (dpl/eis)
1000 PULASKI AVENUE DISTRICT
FEDERAL BLDG.
100 MARKET ST.
ST. LOUIS, MO 63103

16475
Ser 071
16 August 1977

Department of the Army
St. Paul District, Corps of Engineers
Attn: NCSED-ER
1135 U.S. Post Office and Custom House
St. Paul, MN 55101

Gentlemen:

We have reviewed the draft environmental impact statement for Lake Rebecca Park, Hastings, Minnesota. We have no comment to offer on this document.

Thank you for the opportunity to review this environmental impact statement.

Sincerely,

C.E. Johnson, Jr.
C. E. JOHNSON, JR.
Environmental Protection Specialist
By direction of the District Commander

Copy to:
COMDT (G-WEP-7)
DOT SECREP Region V
DOT (tes), Office of Environmental Affairs
CEQ (5)



LAND OF QUALITY FOODS

STATE OF MINNESOTA

DEPARTMENT OF AGRICULTURE
STATE OFFICE BUILDING
SAINT PAUL, MINN. 55155
TELEPHONE: (612) 296-2956

August 10, 1977

Major Walter L. Hama
Acting District Engineer
Department of the Army
St. Paul District, Corps of Engineers
1135 U. S. Post Office
St. Paul, Minnesota 55101

RE: NCSED-ER

Dear Major Hama:


We have reviewed the draft EIS and development plan for Lake Rebecca at Hastings, Minnesota.

Inasmuch as the present entire project area is zoned recreational, it does not appear that the development plan creates issues which are of major concern to the Department of Agriculture.

The Department does appreciate the opportunity to review and comment on such proposals.

Sincerely,

MINNESOTA DEPARTMENT OF AGRICULTURE


Rollin M. Dennistoun, Ph.D.
Assistant Commissioner

RMD:NK



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UNIVERSITY OF MINNESOTA
TWIN CITIES

Office of the State Archaeologist
215 Ford Hall
224 Church Street S.E.
Minneapolis, Minnesota 55455
(612) 376-1352, (612) 373-2601

August 9, 1977

Col. Forrest T. Gay III, District Engineer
Corps of Engineers, St. Paul District
U. S. Post Office Building
St. Paul, Mn. 55101

Dear Col. Gay:

This letter gives my evaluation of the draft environmental impact statement for Lake Rebecca Park, Hastings, Minnesota, dated June 1977.

I agree with the recommendations in that draft where on pages 29 and 44 it is stated that an intensive archaeological survey of the impacted areas will be required before construction begins.

Sincerely,

Elden Johnson (du)

Elden Johnson
State Archaeologist

EJ/tv



U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

REGION 5
18209 DIXIE HIGHWAY
HOMERWOOD, ILLINOIS 60430
August 17, 1977

IN REPLY REFER TO HED-05

U.S. Corps of Engineers
St. Paul District
1135 U.S. Post Office and Custom House
St. Paul, Minnesota 55101

Dear Sirs:

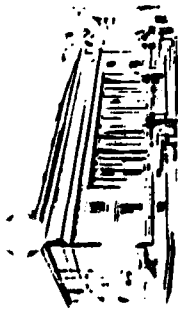
The draft environmental statement for the recreational development and fish and wildlife enhancement, Lake Rebecca, Hastings, Minnesota has been reviewed. We find that the highway system is not affected by the proposal and consequently have no substantive comments to offer.

Sincerely yours,

Donald E. Trull
Regional Administrator

W. G. Enrich
W. G. Enrich

By: W. G. Enrich, Director
Office of Environment and Design



MINNESOTA HISTORICAL SOCIETY

600 Cedar Street, St. Paul, Minnesota 55101 • 612-296-2747

5 August 1977

Walter L. Hens
Major, Corps of Engineers
Acting District Engineer
Department of the Army
St. Paul District, Corps of Engineers
1135 U.S. Post Office and Custom House
St. Paul, Minnesota 55101

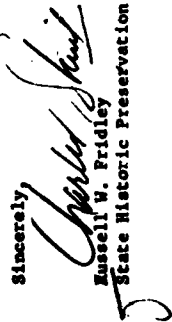
Dear Major Hens:

RE : WCESD-ER
Lake Rebecca Park
Hastings, Minnesota

The Draft Environmental Impact Statement for the Lake Rebecca Project promises that a thorough and comprehensive examination of prehistoric and historic cultural resources will be made. I see no reason to add any further comment, other than to endorse the goals outlined, and to assure the Corps that this office will be eager to assist in the assessment of cultural resources identified.

I might also note that Society archaeologists, Douglas George and Douglas Birk, have conducted some work on Grey Cloud Island and on Sand Point, both areas in the river bottom. On Grey Cloud Birk and George found prehistoric materials buried under a meter of alluvium. On Sand Point Birk found Middle Woodland materials buried more than two meters below the surface of a slightly raised beach ridge. The lesson to be learned from this work is that prehistoric materials may be buried very deeply, and that any shovel-testing program should take the possibility into account.

Thank you for your attention to cultural resources in your planning process.

Sincerely,

Russell W. Fridley
State Historic Preservation Officer

RWF/Er

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Office Memorandum

TO : Walter L. Heme
Major, St. Paul District
Corps of Engineers NCSD-ER

DATE: August 15, 1977

CORPS RESPONSES TO THE MINNESOTA
DEPARTMENT OF ENVIRONMENTAL PLANNING/CRITICAL AREAS

FROM : Clifton Alchinger **CJA**
Critical Areas Coordinator

PHONE: 296-2686

SUBJECT: Mississippi River Critical Area Comments on the Proposed Recreational
Development and Fish and Wildlife Enhancement at Lake Rebecca, Hastings,
MN

The staff for the Mississippi River Corridor Critical Area has reviewed the above referenced project submitted to this office in the form of a draft EIS. Although a formal Critical Area review and recommendation for the Lake Rebecca Park in Hastings will not be undertaken by the Metropolitan Council and the Environmental Quality Board (EQB), the Critical Area staff highly encourages the project and would like to comment briefly on the proposed enhancement plans.

The general upgrading of the Lake Rebecca area near Hastings represents the type of action encouraged by the Critical Area Standards and Guidelines for the development of the water and related land resources of the Mississippi River Corridor. The project, providing public access to protected open space and high quality water resources is compatible with the intent and purpose of the Critical Area Act and its administration. The enhancement of Lake Rebecca and the additional natural scenic and recreational resources that will be available for public use and enjoyment is recommended by the Critical Area staff but several details and minor concerns of the project, as outlined in the draft document, should be further emphasized:

- 1) The diversion of the existing storm sewer will probably alter the suspended sediment load of the Mississippi River. The effects of this diversion should be carefully monitored to determine any significant changes in the water quality of the River. 17
- 2) Adequate sanitary facilities should also be provided and maintained within the park to protect water quality and public health. 18
- 3) Hazardous winter conditions resulting from the aeration equipment on part of Lake Rebecca, should be carefully marked with emergency procedures. 19
- 4) Adequate controlling measures and safety procedures should be implemented for hunting, snowmobiling and other possibly disturbing influences in the area. 20
- 5) All potentially significant archaeological sites should be minimized during the construction period. 21
- 6) Earthwork and removal of vegetation should be minimized during the construction period. 22
- 7) Traffic congestion should be anticipated and planned for. 23

17. Under the plan as now proposed, the storm sewer flow would not be diverted, rather separated from the lake by a dike. The effects on the suspended sediment load of the Mississippi River from this action would be negligible.

18. We concur. The proposed sanitary facilities are designed to serve anticipated user levels.

19. We concur. This would be an operation and maintenance responsibility of the city of Hastings.

20. This would also be an operation and maintenance responsibility of the city of Hastings.

21. All efforts will be taken to insure the protection of cultural resources.

22. We concur. The proposed plan reflects the least amount of disturbance possible in achieving project goals.

23. We concur. The city of Hastings is aware of potential problem areas and will take the necessary remedial actions.

PA. 2
8/15/77

The Lake Nabecca Park Project, as presented in the draft Environmental Impact Statement, is endorsed by the Critical Area staff. It will greatly improve the Lake Nabecca portion of the Mississippi River Corridor area and will provide an accessible scenic and recreational area for public use.

/dc



August 17, 1977

**Mayor Walter L. Heme
Acting District Engineer
St. Paul District Corps of Engineers
1135 U.S. Post Office and Custom House
St. Paul, Minnesota 55101**

**202: Draft Environmental Impact Statement (EIS) on Proposed Project for Lake Rebecca, Upper Mississippi River at Hastings, Minnesota
Metropolitan Council Referral File No. 4712**

Dear Mayor Hems:

At its meeting August 11, 1977, the Metropolitan Council considered the above project. The project is not in conflict with Metropolitan Development Guide plans and policies. It will be a needed improvement at a point on a possible regional trail corridor. The project is located in the Mississippi River Corridor Critical Area; however, the Minnesota Environmental Quality Board Area Coordinator will provide comments separately on the project's accord with the Interim Development Regulations.

Sincerely,

METROPOLITAN COUNCIL

John Boland
Chairman

cc: James W. Cosby, Administrator, City of Hastings
Jim Schoettler, Metropolitan Council Staff

Agency Created to Coordinate the Planning and Development of the Town and District of Anacostia, D.C.

TECHNICAL

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ST. PAUL DISTRICT, CORPS OF ENGINEERS
DEPARTMENT OF THE ARMY

EXHIBITS



United States Department of the Interior

FISH AND WILDLIFE SERVICE

Federal Building, Fort Snelling
Twin Cities, Minnesota 55111

IN REPLY REFER TO:

AFA-SE

APR 21 1977

Colonel Forrest T. Gay, III
District Engineer, St. Paul District
Corps of Engineers
Department of the Army
1135 U.S. Post Office & Custom House
St. Paul, Minnesota 55101

Attn: Roger E. Lake
Engineering Division

Dear Colonel Gay:

Thank you for your April 11, 1977, letter (NCS-ED-ER) requesting our comments concerning the potential impacts upon threatened or endangered flora and fauna of a lake rehabilitation proposed at Lake Rebecca in Hastings, Minnesota.

To the best of our knowledge, no threatened or endangered flora and fauna occur in the project area.

Sincerely yours,

A handwritten signature in cursive script, reading "James M. Engel", is written above the typed name.

James M. Engel
Acting Assistant
Regional Director

Exhibit 1

SECTION 404(b) EVALUATION

The specific activities associated with the Lake Rebecca project requiring evaluation under Section 404(b) of P.L. 92-500 are the placing of fill in the proposed recreation area (Type I wetland) and the construction of the dike across the outlet stream.

Approximately 10 acres of floodplain forest (Type I wetland) would be filled as part of the development of the recreation area. The actual acreage filled would probably be less than 10 acres as the entire area would not need to be filled--only those areas where roads, parking lots, etc., would be located.

The dike would occupy approximately 3 acres. The area filled would be part of the outlet stream and adjacent floodplain forest areas.

The parameters in the table below were reviewed and considered as part of the evaluation process. A discussion of the salient effects of the fill activities follows.

I. Physical Effects

A. Potential destruction of wetlands-effects on:

1. Food chain production
2. General habitat
3. Nesting, spawning, rearing and resting sites for aquatic or land species
4. Those set aside for aquatic environment study or for refuges
5. Natural drainage characteristics
6. Sedimentation patterns
7. Flushing characteristics
8. Current patterns
9. Wave action, erosion or storm damage protection
10. Storage areas for storm and flood waters
11. Prime natural recharge areas
12. Cumulative effects of alterations

B. Impact on water column

1. Reduction in light transmission
2. Aesthetic values
3. Direct destructive effects on nektonic and planktonic populations

C. Covering of benthic communities

1. Actual covering of benthic communities
2. Changes in community structure or function

PROBABLE IMPACTS		
BENEFICIAL	NO APPRECIABLE EFFECTS	ADVERSE
		X
		X
	X	
	X	
	X	
	X	
	X	
	X	
	X	
		X
	X	
	X	
	X	
	X	
	X	
		X
		X

I. Physical Effects (continued)

D. Other effects

1. Changes in bottom geometry and substrate composition
2. Water circulation
3. Exchange of constituents between sediments and overlying water with alterations of biological communities

II. Chemical - Biological Interactive Effects

A. Water column effects of chemical constituents

B. Effects of chemical constituents on benthos

III. Selection of Disposal Sites

A. Impacts of fill on chemical, physical and biological integrity of aquatic ecosystem

1. Impact on food chain
2. Impact on diversity of plant and animal species
3. Impact on movement into and out of feeding, spawning, breeding and nursery areas
4. Impact on wetland areas having significant functions of water quality maintenance
5. Impact on areas that serve to retain natural high waters or flood waters

B. Impacts on water uses at proposed fill site

1. Municipal water supply intakes
2. Shellfish
3. Fisheries (including mitigation)
4. Wildlife (including mitigation)
5. Recreation activities
6. Threatened and endangered species
7. Benthic life
8. Wetlands
9. Submerged vegetation
10. Size of disposal site
11. Cultural resources, scenic and conservation values

IV. Navigation Impacts

1. Impairment to maintenance of navigation
2. Economic impact on navigation and anchorage

PHYSICAL EFFECTS NO. 10		
BENEFICIAL	NO. 11	NO. 12
	X	
	X	
	X	
	X	
	X	
	X	
X		
X		
		X
	X	
		X
	X	
	X	
	X	
X		
	X	
	X	
	X	
	X	
	X	
	X	
	X	

V. Considerations to Minimize Harmful Effects

The size of the area to be filled would be kept to the minimum necessary to provide the desired recreational facilities.

VI. Quality of Fill Material

Most or all of the material used for fill would be the same as, or quite similar to, that found on the area that would be filled. The fill would be alluvial deposits of sand, silty sands, sandy silts, etc., that make up the island at Lake Rebecca. If outside fill is required, it would be pit-run sands or silty sands trucked into the site.

VII. Review of State Water Quality Standards

By the criteria outlined in the Minnesota Water Quality regulation WPC 14, Lake Rebecca is classified as a 2B Fisheries and Recreation lake. The proposed fill activity would not change this classification. Construction of the dike across the outlet stream would violate the Minnesota water quality standard for turbidity (during construction).

VIII. Discussion

I.A.1; I.A.2 - The filling of the floodplain forest for recreation facilities would adversely affect its capabilities to provide food and general habitat for wildlife.

I.A.10; III.A.5 - Lake Rebecca and the adjoining island would no longer provide storage area for Mississippi River floodwaters during the 1- to 17-year floods. Floods higher than the 17-year flood would top the road and flood the entire area.

I.C.1; I.C.2 - The existing stream benthos at the site of the proposed dike would be covered and the area would no longer be habitable by benthic organisms.

III.A.1; III.A.2 - The exclusion of rough fish from Lake Rebecca by the dike would lengthen the food chain in the lake and make it more complex. The lake would support a more diverse flora and fauna with control of rough fish.

III.A.3 - Mississippi River fish would no longer have access to Lake Rebecca for spawning and feeding or as a nursery area. Primary species affected would be carp, gizzard shad, buffalofish, and northern pike.

III.B.3 - As a result of the project, Lake Rebecca would support a viable, productive sport fishery-- something it is presently unable to do.

III.B.4; III.B.8 - Raising the level of the lake with the dike would increase wetland acreage on the upper end of the lake and correspondingly improve the wildlife habitat value of this area.

III.B.5 - The recreational qualities of Lake Rebecca and associated land area would be improved.

EXHIBITS



Exhibit 3

AD-A120 755

RECREATIONAL DEVELOPMENT AND FISH AND WILDLIFE
ENHANCEMENT LAKE REBECCA HASTINGS MINNESOTA(U) CORPS OF
ENGINEERS ST PAUL MN ST PAUL DISTRICT MAR 78

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UNCLASSIFIED

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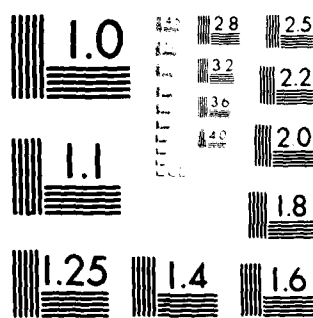
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MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A



Looking northward showing the
wetlands adjacent to the upper
east shore of Lake Rebecca

Exhibit 3

EXHIBITS



Lake Rebecca looking southward

Exhibit 3

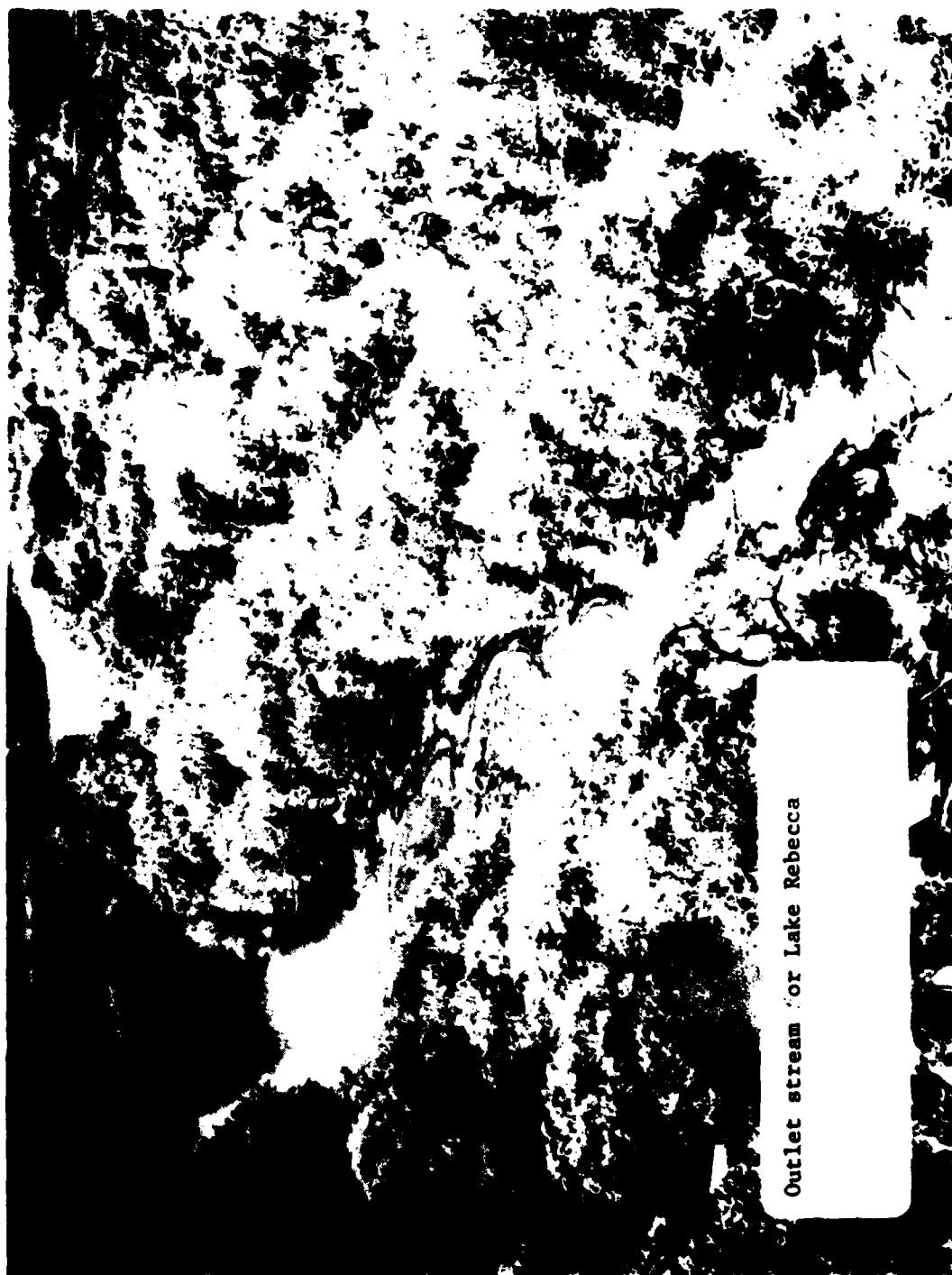


Exhibit 3

EXHIBITS



Dike at Lock and Dam #2



Lower east shoreline, site of
the proposed swimming beach

FINDINGS
CONSTRUCTION ACTIVITIES IN WETLANDS
LAKE REBECCA
HASTINGS, MINNESOTA

1. General - These findings are made pursuant to the requirements of Section 2(a) of Executive Order 11990. The criteria set forth in Section 5 of Executive Order 11990, the Chief of Engineers wetlands policy (33C.F.R. 209.145 (e)(3)), and the Environmental Protection Agency guidelines on the discharge of dredged or fill material (40 C.F.R. 230) were considered in arriving at these findings.

2. Proposed Wetland Activities - The proposed wetland-related activities at Lake Rebecca include (1) filling approximately 10 acres of floodplain forest (Type I wetland) for the development of day use recreational facilities; (2) construction of a dike in a floodplain forest and across a shallow stream to prevent a storm sewer from discharging into Lake Rebecca and to help control lake levels; and (3) raising the level of Lake Rebecca 2.5 feet, which will flood approximately 9 acres of existing Type II-III wetlands and 13 acres of floodplain forest.

3. Section 5 of E.O. 11990 lists the factors that must be considered in wetland-related activities relevant to their effect on the survival and quality of the wetlands.

Table Consideration of Section 5, E.O. 11990 Factors For Proposed Wetland Activities

(a) Public Health, Safety and Welfare Factors

1. Water Supply	N.A.	
2. Water Quality	Yes	4.028
3. Groundwater Recharge & Discharge	No	
4. Pollution Assimilation	No	
5. Floodwater Storage	Yes	4.012-4.013
6. Storm Wave Protection	N.A.	
7. Sedimentation Function	Yes	4.028
8. Erosion Control	N.A.	

(b) Maintenance of Natural Systems

1. Conservation and Productivity of Flora	Yes	4.023-4.047
2. Conservation and Productivity of Fauna	Yes	4.023-4.047
3. Species Diversity and Stability	Yes	4.023-4.047
4. Habitat Diversity and Stability	Yes	4.023-4.047
5. Hydrologic Utility	No	
6. Fisheries	Yes	4.025-4.043
7. Wildlife	Yes	4.023-4.064
8. Timber	Yes	4.023; 4.045-4.046
9. Food Resources	N.A.	
10. Fiber Resources	N.A.	

(c) Other Uses

1. Recreational	Yes	4.010-4.011
2. Scientific	N.A.	
3. Cultural	N.A.	

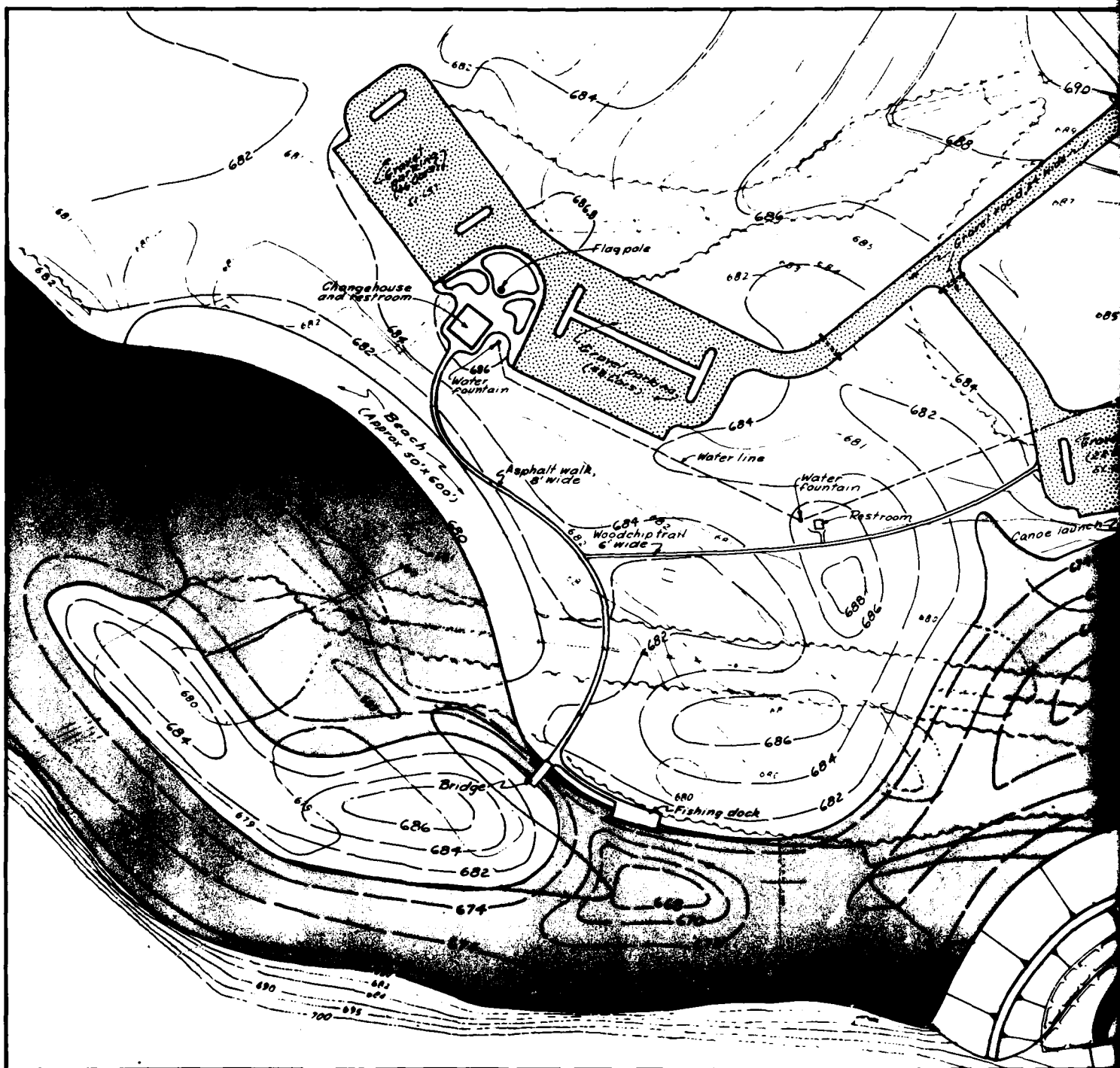
1. N.A. - Not Applicable; the wetland in question does not perform this particular function or use.
2. No - The proposed activity would have no appreciable effect upon the wetland's ability to perform this function or use.
3. Yes - The proposed activity would affect the wetland and its ability to perform its present function or use. The paragraph numbers indicate where a discussion of the effects can be found in the EIS. As it is difficult to separate impacts upon the wetlands completely from impacts on other project areas, the above referenced paragraphs may also contain some discussion of non-wetland related impacts.

Findings - I have evaluated the effects of the proposed wetland-related activities described above. A discussion of the effects can be found in the environmental assessment on the proposed Master Plan Update. I find that there is no practicable alternative to such construction, that the proposed activities include all practicable measures to minimize harm to the wetlands, and that the benefits associated with the alterations outweigh the damage to the wetland resource.

Forrest T. Gay II
FORREST T. GAY, IPI
Colonel, Corps of Engineers
District Engineer

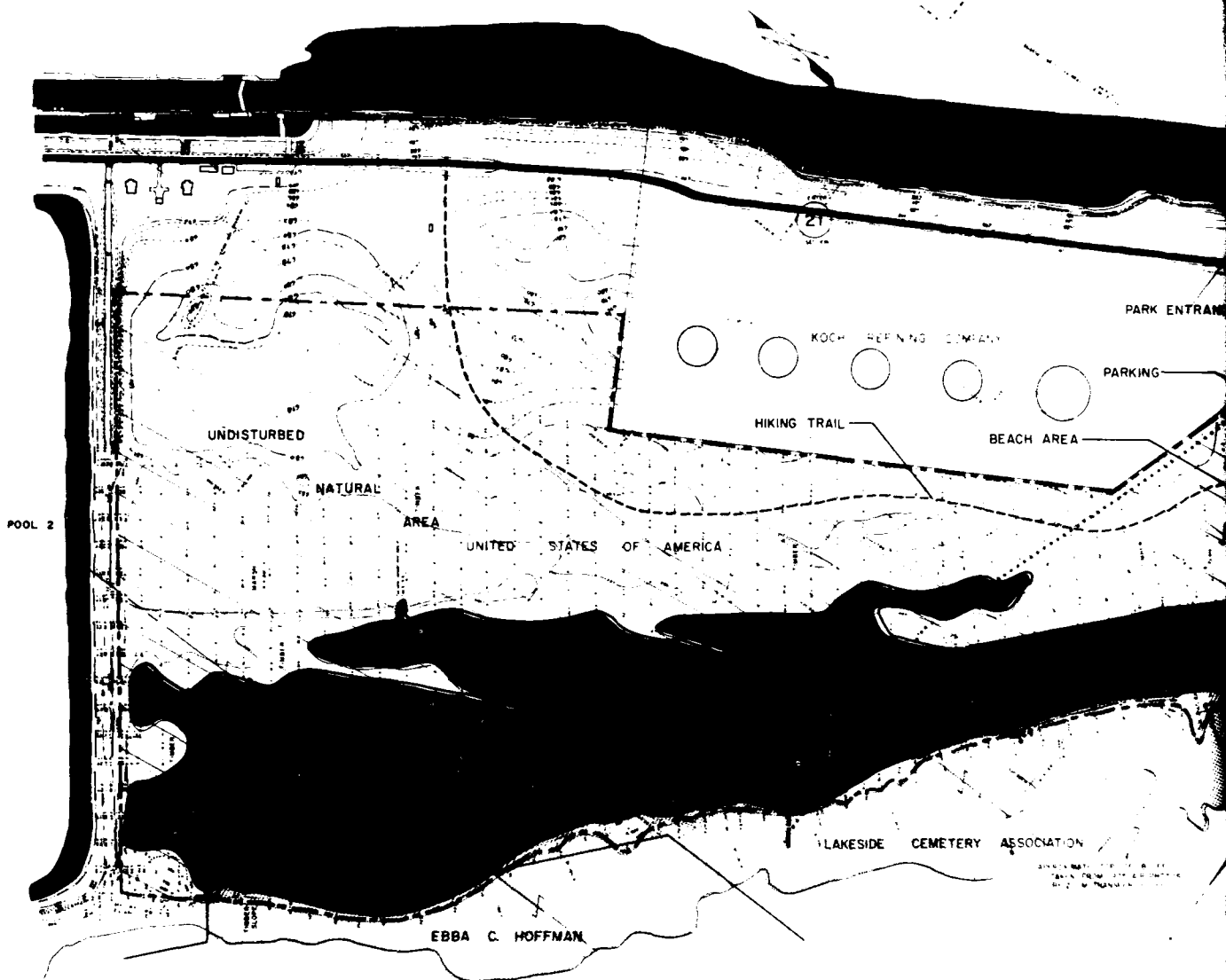
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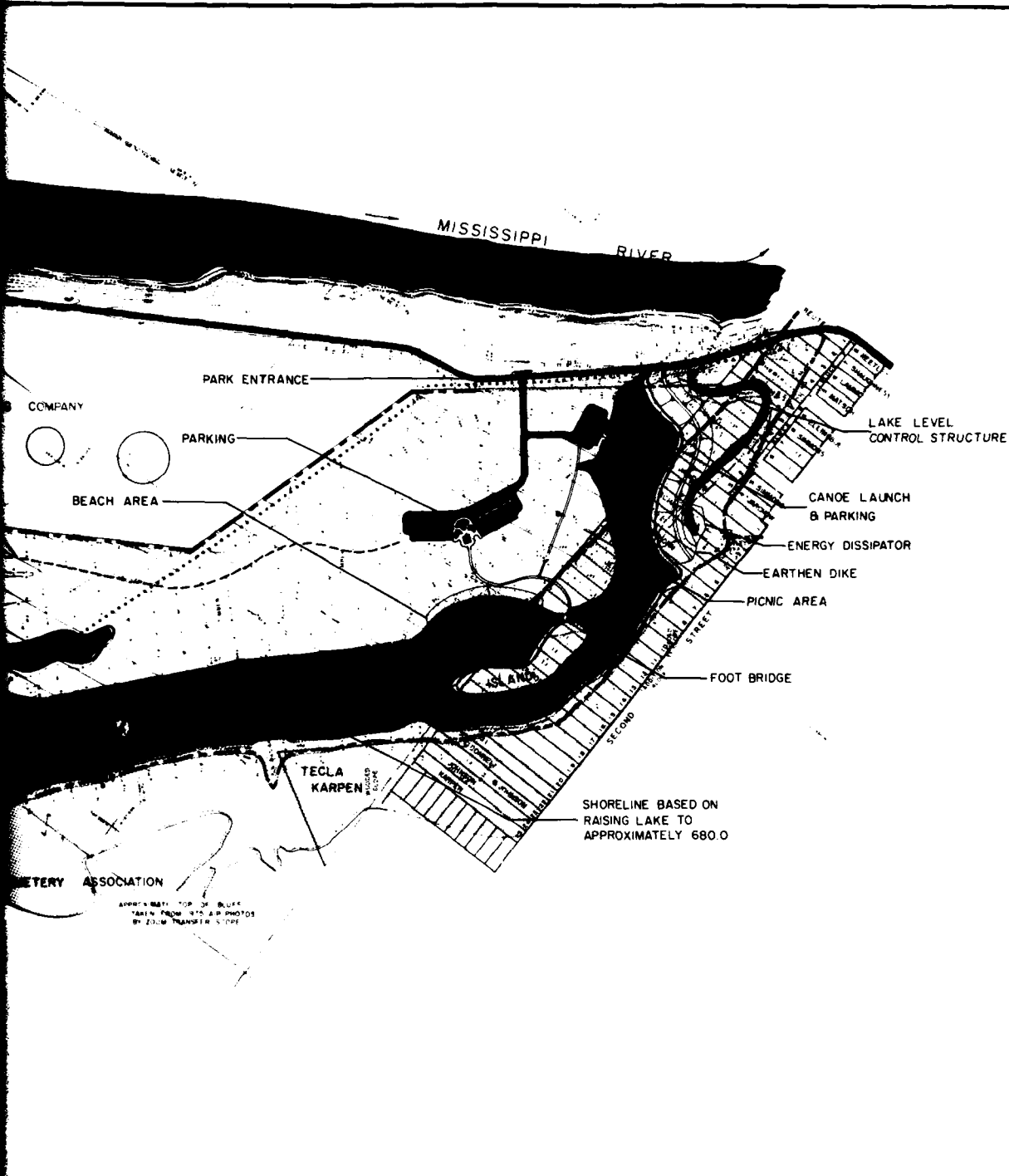


RECREATION PLAN
LAKE REBECCA
HASTINGS, MINNESOTA





GENERAL PLAN LAKE REBECCA HASTINGS, MINNESOTA



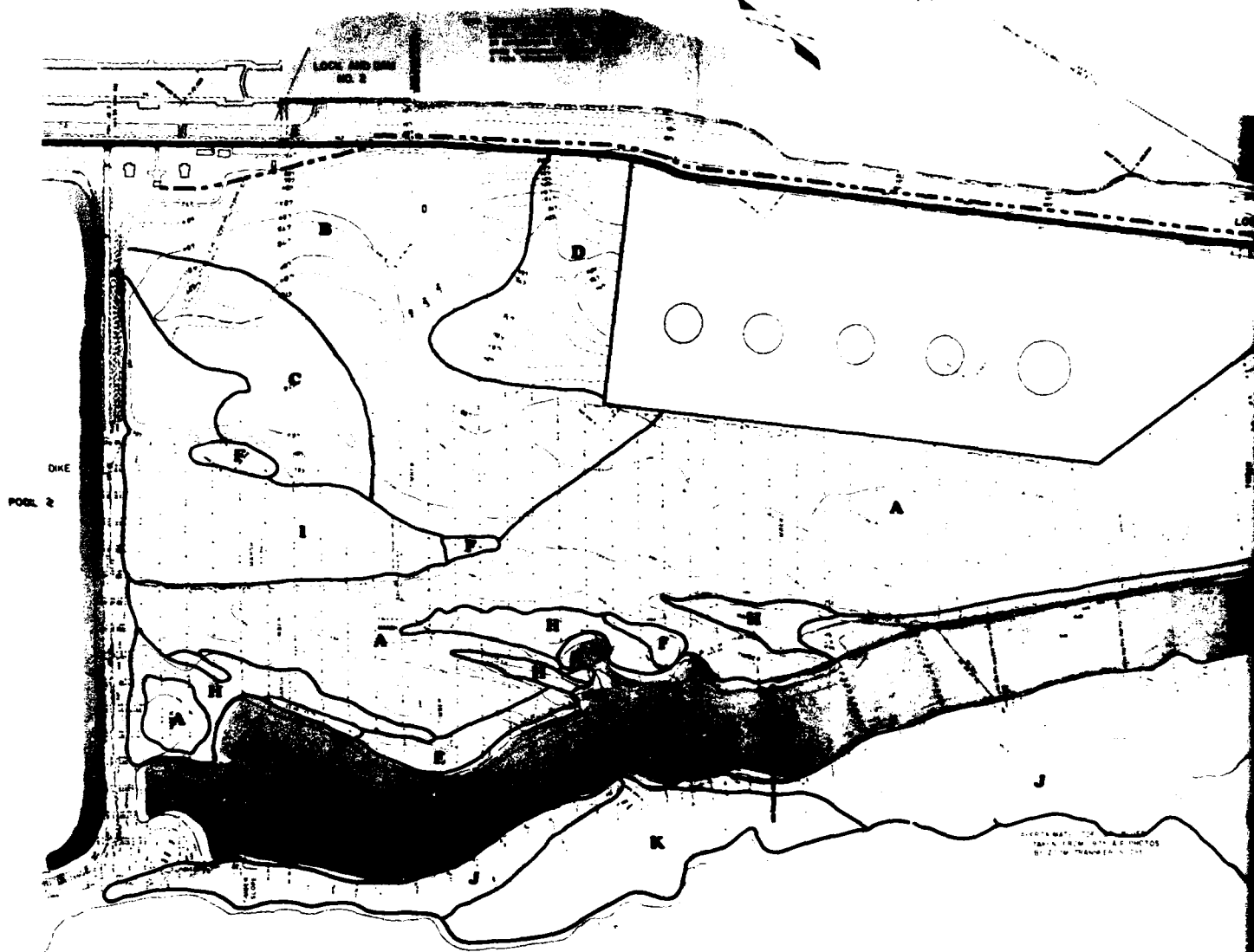
LEGEND

	FLOWAGE EASEMENT		PROJECT BOUNDARY
	SCENIC ZONING		
	EXISTING POWERLINE		
	POWERLINE RELOCATION		
	LANDS TO BE LEASED		

DEPARTMENT OF THE ARMY
ST PAUL DISTRICT CORPS OF ENGINEERS
ST PAUL, MINN 55104

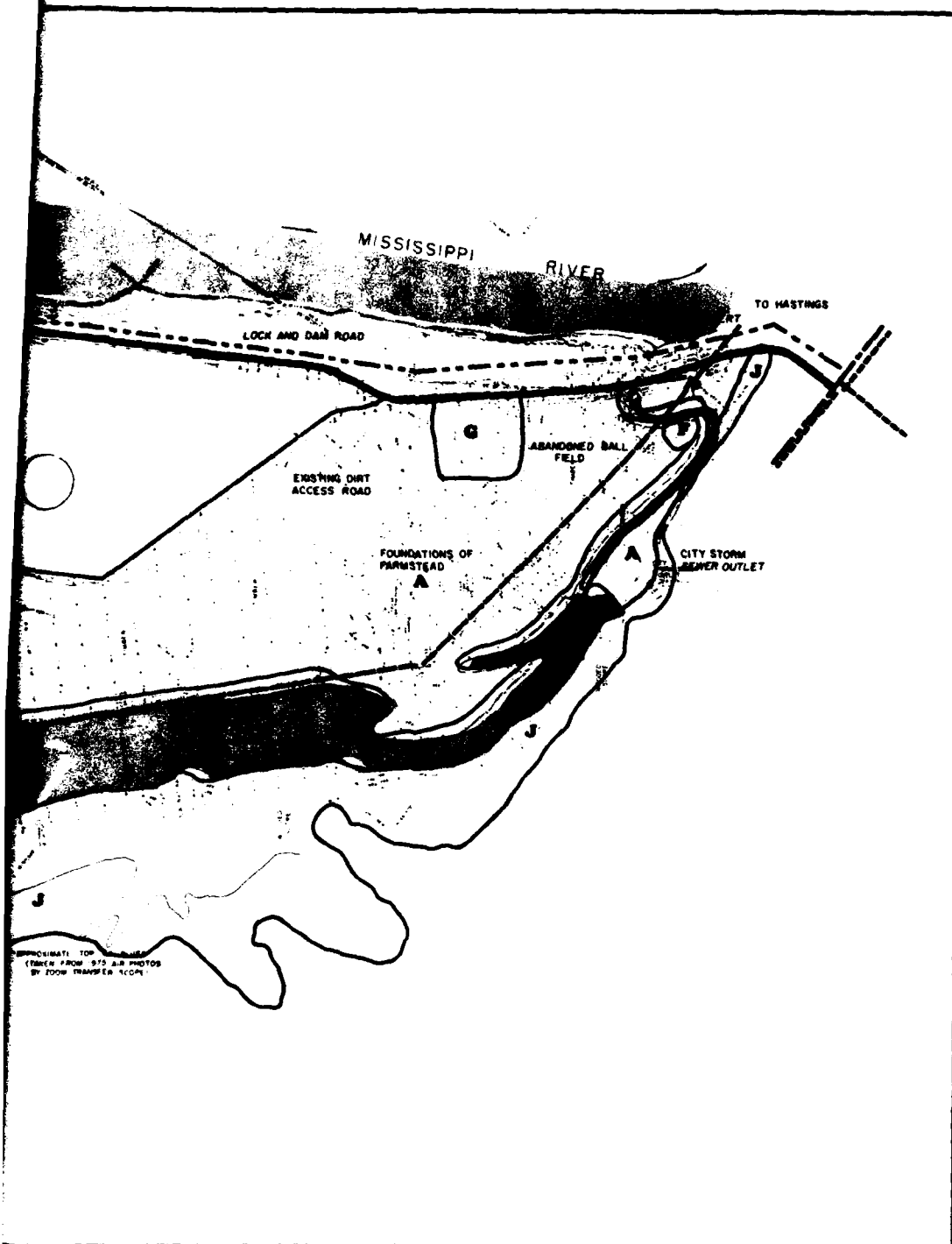
DESIGNED BY: S.G.
DRAWN BY: D.A.E.
CHECKED BY: [Signature]
SUBMITTED BY: [Signature]
DATE: MARCH 1978
SCALE: 1" = 200'

2



EXISTING CONDITIONS
LAKE REBECCA
HASTINGS, MINNESOTA

LEG
 A
 B
 C
 D
 E



LEGEND

0 100 200 300 400 500
SCALE IN FEET



- A** TYPICAL FLOODPLAIN FOREST
- B** DRY FLOODPLAIN FOREST
- C** BLACK WILLOW THicket
- D** SOFT OPEN
- E** LAKE CATTARAUGUS

- F** WILLOW SHRUB THicket
- G** DISTURBED AREA
- H** LAKE SLUDGES
- I** MARSH
- J** UPLAND HARDWOOD FOREST

- K** OPEN HARDWOODS AND RED CEDARS
- CITY WATER
- CITY SANITARY SEWER
- ELECTRICITY
- TELEPHONE

DEPARTMENT OF THE ARMY
11 PAUL DISTRICT CORPS OF ENGINEERS
31 ROAD NUMBER 1074

DESIGNED BY D.A.E.
DRAWN BY *[Signature]*
CHECKED BY *[Signature]*
DATE MARCH 1970
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